LCP CHEMICALS, INC. SUPERFUND SITE

NEXUS SUMMARY TO LCP SITE FOR KUEHNE CHEMICAL

Introduction

Kuehne Chemical Company ("Kuehne") is liable as an operator of the LCP Site at the time of disposal of hazardous substances, see 42 U.S.C. § 9607(a)(2), and as an entity that arranged for the disposal of hazardous substances, see 42 U.S.C. § 9607(a)(3). Kuehne leased a portion of the LCP Site from 1972 through 1981. It discharged hazardous substances, including but not limited to mercury, onto the soil and into waters at the LCP Site during its tenancy in the course of its operations.

Operations

In 1972, Kuehne moved its manufacturing facilities from Elizabeth, New Jersey to Linden, New Jersey. It leased a portion of the LCP Site (Lot Nos. 3.02 and 3.03 and the northern part of 3.01), including Buildings 221 and 223, from 1972 through January 1981.[1]

Throughout that time period, Kuehne obtained chlorine and caustic from LCP and used these materials to manufacture sodium hypochlorite. Kuehne manufactured sodium hypochlorite by blending chlorine and caustic soda. Chlorine and caustic (by-products of LCP operations) were supplied by LCP through overhead pipes that ran from the LCP operation to the Kuehne operation at the LCP Site. The sales contract between Kuehne and LCP states that the risk of loss and responsibility for chlorine tail gas and caustic soda was transferred to Kuehne once it passed into Kuehne's portion of the pipeline.[2] Accordingly, Kuehne cannot disclaim liability for the release of these products into the environment after they were delivered from LCP to

[1] Brown & Caldwell, Remedial Investigation Report, LCP Chemicals, Inc. Superfund Site (July 2013) ("RIR") (Exhibit A) at 1-6 and Figure 1-3.

[2] Contract for Sale and Purchase of Chlorine Gas and Caustic Soda (July 21, 1972) (Exhibit B) ¶ 13.

437431

Kuehne. Kuehne estimates that it manufactured approximately 18 to 25 million gallons of sodium hypochlorite annually from 1972 through 1981.[3]

As part of the contractual arrangement between Kuehne and LCP, Kuehne was also responsible for: (1) loading/unloading LCP's storage facilities, railroad tankers and barges; (2) servicing LCP's tank cars; and (3) occasionally transporting chlorine and caustic soda via tank trailers to LCP's customers. As such, Kuehne's operations on the LCP Site extended beyond the area of their leasehold. Around 1977, Kuehne began packaging some of the chlorine received from LCP in 1-ton cylinders for sale to LCP's customers. In 1978 or 1979, Kuehne began to resell some of the caustic soda received from LCP by directly filling customer's tank trailers.[4]

During its tenancy and operations at the LCP Site, Kuehne is known to have discharged effluent with high levels of chlorine and caustic into an underground pipe that led to South Branch Creek, and has admitted to spills of caustic and sodium hypochlorite. Based upon an EPA memorandum drafted in July 2002, it is likely that the chlorine and caustic purchased by Kuehne from LCP and used by Kuehne on the LCP Site would have contained residual mercury.[5] Mercury would have been present in effluent discharges by Kuehne that caused and/or contributed to the extensive mercury contamination at the LCP Site. For these reasons, and those outlined further below, Kuehne should receive a General Notice Letter ("GNL") from EPA and contribute toward the investigation and cleanup of the LCP Site.

Due to the nature of the chlor-alkali process used by LCP, which manufactures chlorine and caustic as co-products through the electrolytic decomposition of brine in mercury cells, residual amounts of mercury were present in the chlorine gas and caustic soda provided to

[3] Kuehne 104(e) Response (April 27, 1998) (Exhibit C) § 6(c).

[4] Kuehne 104(e) Response (April 27, 1998) (Exhibit C) § 5.

[5] As detailed in the LCP nexus summary, it is undisputed that the chlorine and caustic produced by LCP contained mercury.

Kuehne by LCP, and therefore mercury would also have been in the material discharged by Kuehne at the Site.[6] As demonstrated in the Remedial Investigation Report prepared in July 2013, mercury was detected throughout the Site in both surficial and deep soils, including in and around the Kuehne leasehold.[7] Exceedances of mercury in groundwater were also detected south of Building 221, which was used by Kuehne during its operation at the Site.[8] The RI Report concludes that it is "likely Kuehne mercury waste was disposed of along with the LCP mercury waste."[9]

Known Discharges

Kuehne's processing tank was attached to a connecting valve, which then connected to an underground pipe that discharged into a flume and ultimately led to a tributary of the Arthur Kill (the South Branch Creek).[10] In October 1981, Kuehne received a Notice of Civil Administrative Penalty Assessment from NJDEP for discharging effluent with unlawful pH levels and "extremely high concentrations" of chlorine and caustics[11] into South Branch Creek on January 15-16, 1981 and January 25-26, 1981.[12] In its response to NJDEP's penalty assessment, Kuehne acknowledged that it and LCP had been "physically and economically entwined," referring to the symbiotic business relationship and close proximity of the two entities, but denied liability and

[6] EPA, National Emission Standards for Hazardous Air Pollutants: Mercury Emissions from Mercury Cell Chlor-Alkali Plants (July 3, 2002), indicating the presence of residual amounts of mercury in caustic soda and chlorine gas (Exhibit D).

[7] RIR (Exhibit A) at Figure 6-1a and 6-1b.

[8] RIR (Exhibit A) at Figures 1-3, 6-18a and 6-18b.

[9] RIR (Exhibit A) at 1-6.

[10] OAL Initial Decision (March 10, 1987) (Exhibit E) at 22.

[11] Notice of Civil Administrative Penalty Assessment (October 7, 1981) (Exhibit F) § 6.

[12] OAL Initial Decision (Exhibit E); and see RIR (Exhibit A) at 2-18.

instead pointed to chlorine and caustic leaks and discharges from the LCP process as the source of contamination on the Site.[13]

Sediments and soils within South Branch Creek are contaminated with mercury and other constituents. The excavation of sediments and marsh soils from South Branch Creek is one component of the selected remedy for the Site. Kuehne's historical discharges contributed to this contamination.

Free chlorine was detected in concentrations as high as 124,430 mg/l in Kuehne's effluent discharge, which is similar to the concentration found in bleach, a product that was produced by Kuehne.[14] A representative of NJDEP visited Kuehne on January 26, 1981 and observed a valve connecting the filtering process pipe to the permitted outfall pipe, which "provided a physical conduit for the passage of pollutants into the waters of the State."[15] NJDEP directed the valve to be removed. A February 24, 1981 internal NJDEP memorandum concluded that Kuehne "dumped caustic material with the use of the valve in the process valve and acid by pouring hydrochloric acid into their discharge line."[16] During an inspection of the Kuehne discharge line, NJDEP discovered a large break on the underside of the discharge pipe approximately 12 feet from the outfall.[17] The NJDEP engineer observed that a "large flow of discharge water flowed from this break, suggesting that it may be the source of wastewater leaking through the flume walls."[18]

---

[13] Letter from Kuehne to NJDEP (October 27, 1981) (Exhibit G).

[14] Notice of Civil Administrative Penalty Assessment (Exhibit F) § 7.

[15] Notice of Civil Administrative Penalty Assessment (Exhibit F) § 8.

[16] Memorandum from C. Maack to C. Johnson (February 24, 1981) (Exhibit H).

[17] Memorandum from C. Maack to C. Johnson (February 24, 1981) (Exhibit H).

[18] Memorandum from C. Maack to C. Johnson (February 24, 1981) (Exhibit H).

Further, Kuehne has admitted that "there were a few occasions during the period from 1972 to 1981 when small amounts of chlorine were released into the atmosphere and when small spills of caustic soda and sodium hypochlorite would occur and be neutralized, diluted and broken down into salt and water."[19] Thus, Kuehne is a responsible party for the contamination at the LCP Site.

Multiple LCP Complaints on Kuehne Discharges

In a complaint filed on October 31, 1980, LCP alleged that Kuehne repeatedly discharged sodium hypochlorite into the waters of the state.[20] Less than a year later, LCP filed a complaint with the Linden Police Department claiming that samples taken from a stream that crossed its property contained a large volume of bleach and caustic soda. LCP claimed that they traced the source to a sewer pipe from Kuehne's operations.[21]

Also in 1981, in a letter to NJDEP regarding contamination of the flume by Kuehne that had previously been sampled by NJDEP and LCP (which led to the issuance of the aforementioned NJDEP penalty assessment to Kuehne), LCP noted that the pH level of water entering the flume remained high and attributed this condition to groundwater and tidal backwash leaching caustic soda from contaminated soil "in the area of the previous Kuehne dumping site."[22] Based on the foregoing, Kuehne had multiple discharges of hazardous substances at the LCP Site.

---

[19] Exhibit C § 10.

[20] Complaint in Linden Chemicals & Plastic, Inc. v. Kuehne Chemical Company, Inc., et al., Docket No. L-11734-80 (October 31, 1980) (Exhibit I) at 12-13.

[21] Complaint filed with Linden Police Department (February 6, 1981) (Exhibit J).

[22] Letter from LCP to NJDEP (February 18, 1981) (Exhibit K).

Conclusion

As an operator and arranger that is known to have contributed to contamination both on and off-site from its operations at the LCP Site, Kuehne is a potentially liable party under CERCLA and should receive a GNL and be required to contribute to the investigation and remediation of the LCP Site.

Exhibit A

Remedial Investigation Report
LCP Chemicals, Inc. Superfund Site
Linden, New Jersey
Volume I of V
Report Text

Prepared for
ISP Environmental Services, Inc.
500 Hercules Road
Wilmington, Delaware 19808-1599

Revised October 2013
July 2013

Project Number: 137005

Brown AND Caldwell
2 Park Way, Suite 2A
Upper Saddle River, New Jersey 07458

693610

R2-0006988

Table of Contents

Appendices

List of Tables

List of Figures

Executive Summary

The LCP Chemicals, Inc. Superfund Site (LCP site) Remedial Investigation (RI) is reported herein. The RI field investigation has been performed in two phases under the regulatory and technical oversight of the USEPA, with a further adjunct investigation of two off-site ditches located adjacent to the site. This report includes a comprehensive characterization of the nature and extent of contamination on the site in addition to assessments of risk to human health and the environment.

This RI Report represents a revision of the version that was submitted in July 2013 and was subsequently approved by USEPA on August 12, 2013. The revisions made herein do not reflect any changes in content from the July 2013 and have been made solely to correct minor typographical errors and also updates to the document format.

Site History

The LCP site is a former chemical manufacturing plant located on an approximate 26 acre property. The site was developed in the early 1950s for the production of chlorine by the brine cell process (mercury cathode carbon anode) also known as the chlor-alkali process. Chlorine manufacturing operations commenced in 1955 and continued until the plant was shut down in 1985. Related operations, including a hydrogen gas processing plant and sodium hypochlorite manufacturing area were also located on the site. While the plant was initially developed and operated by GAF beginning in 1955, the facility was sold to LCP in 1972 and was expanded and operated by LCP until 1985. Activities continued on site (by LCP and others) until 2000.

Hanlin Group, Inc., d.b.a. LCP, filed a petition under Chapter 11 of the bankruptcy code in 1991 and liquidated all of its assets before April 1994 using the proceeds to pay creditors including the USEPA. The Linden, New Jersey property was abandoned by Hanlin Group pursuant to an order of the Bankruptcy court and ownership reverted back from the bankruptcy estate. Title to the property is currently listed as LCP-Chemicals New Jersey, a d.b.a. for Hanlin. Hanlin is a defunct corporate entity. The facility has remained abandoned since 2000.

The site was placed onto the National Priority List (NPL) in 1998. A voluntary Administrative Order was entered into by the USEPA and ISP-ESI in 1999 to perform a Remedial Investigation and Feasibility Study (RI/FS). ISP Environmental Services Inc. (ISP-ESI) is currently the only potentially responsible party, among several, that has cooperated with USEPA to address the site.

The LCP site has a complex history of industrial ownership. The north-central and eastern portions of the property were owned and developed by various companies preceding GAF dating back to the 1880s. Other portions of the property were previously owned by E.I. duPont de Nemours and Central Railroad of New Jersey (now Conrail).

The entire area of the LCP site and nearly all of the surrounding area was historically tidal wetlands. It was necessary to raise the elevation prior to the historic development of these areas for industrial and other uses through the placement of anthropogenic fill. The filling of the property occurred during the prior ownership of the property, before the development of the LCP site in 1955.

The site has been zoned for "heavy industrial use" and continues as such as do the surrounding properties. It is anticipated that the upland portion of the site could possibly be re developed into another industrial use, such as warehousing, transportation or electric power generation.

Contamination Sources

The RI results are summarized by the finding of the widespread presence of mercury in various environmental media as a result of manufacturing activities at the LCP site. Other contaminants potentially related to chlorine production are also found, including hexachlorobenzene (HCB), polychlorinated naphthalenes (PCNs), and polychlorinated dibenzo furans (PCDFs). Polychlorinated biphenyls (PCBs) are also a site-related constituent due their potential presence in electrical equipment on the site. Each of these other site-related constituents is present at levels much less than those of mercury. These other site-related contaminants are co-located with mercury; however the frequency and magnitude of exceedances of soil remediation standards is, respectively, less than that of mercury.

Contamination is also present as a result of the prior placement of anthropogenic fill materials. Contaminants that are ubiquitous in fill materials include metals/metalloids (e.g., lead, chromium, and arsenic), and polycyclic aromatic hydrocarbons (PAHs) as a result of the common practice of using combustion residues (e.g., coal ash and slag) as fill. Other contaminants in the anthropogenic fill are consistent with sources of industrial fill from neighboring properties (e.g., duPont, GAF) and include arsenic and chlorobenzenes. Other various chemicals, including dioxins, are also found from regional sources such as air deposition and sediment transport.

Contamination Conditions

The surficial fill at the LCP site is impacted primarily with mercury which is widely distributed throughout the site. This contamination includes some visual observations of elemental mercury in areas surrounding the main production buildings. However, the horizontal and vertical migration of mercury and other site-related constituents is relatively limited and the underlying soils contain concentrations that are lower than those in the overlying fill.

Groundwater contamination at the site results from the dissolution of the various contaminants from site soils (both LCP related and fill related). Groundwater contamination, however, shows minimal migration either horizontally or laterally and is not moving off site to any significant extent. In addition, groundwater at the site is non-potable as the result of naturally occurring saline conditions. Since the groundwater is saline, alternative groundwater quality criteria (AGWQC) are relevant at the site, and site-specific AGWQC have been developed.

Sediments and low marsh soils in South Branch Creek (an on-site, man-made tidal ditch) are contaminated with mercury and other constituents, especially in the "upstream" areas. The contamination decreases with distance from the manufacturing area of the site and is essentially at background levels where South Branch Creek meets the Arthur Kill. Similar contaminated sediment conditions are observed in the Northern Off-Site Ditch Sediments, albeit at lower concentrations than South Branch Creek. The sediment contamination in South Branch Creek and the Northern Off-Site Ditch do not appear to be due to ongoing sources. Biological specimens (fish and crabs) collected in South Branch Creek contain elevated concentrations of mercury and other constituents compared with those collected in a nearby area.

The Human Health Risk Assessment (HHRA) indicated that exposure to soil and soil vapor by future commercial/industrial workers, site-specific workers, and construction/utility workers may result in adverse non-cancer effects; exposure to soil by future commercial/industrial workers may also result in adverse cancer effects. Dermal contact with groundwater by construction/utility workers has the potential to result in adverse non-cancer effects. Potential non-cancer hazards in soil and soil vapor were driven by mercury; potential non-cancer hazards in groundwater were driven by furans and manganese. No unacceptable cancer or non-cancer risks were identified for current/future trespassers

exposed to sediment/bank soil in South Branch Creek. Hypothetical use of groundwater for potable purposes was also evaluated to support remedial decision-making and risk management; the HHRA indicated future potable use of groundwater by commercial/industrial workers may result in adverse cancer and non-cancer effects.

The Baseline Ecological Risk Assessment (BERA) indicated that contaminants in South Branch Creek sediment, primarily arsenic, barium, and mercury, have the potential to result in adverse ecological effects to benthic macroinvertebrates and sediment-probing birds. Potential ecological risks were also identified for terrestrial mammals (insectivores) and birds (invertivores and, to a lesser extent, carnivores) potentially exposed to contaminants in upland soil, driven primarily by mercury and hexachlorobenzene. However, the former facility offers limited ecological habitat for these receptors as the majority of the Site is paved or occupied by structures.

Section 1

Introduction

This report presents the findings of a multi-phased Remedial Investigation (RI) performed at the LCP Chemicals, Inc. Superfund Site located in Linden, New Jersey. The initial phase (Phase I) of the RI was performed in 2001-2002 and was reported in the document titled, "Site Characterization Summary Report, LCP Chemicals Superfund Site, Linden, New Jersey", (Brown and Caldwell, August 2002). The Phase II RI field investigation was performed during 2006-2007 and the data was reported in the document titled, "Phase II Site Characterization Summary Report, LCP Chemicals Superfund Site, Linden, New Jersey, (Brown and Caldwell, September 2007). In addition an adjunct investigation to the RI was performed in 2011 on the two off-site ditches, in response to EPA comments on the draft RI Report (Brown and Caldwell, September 2008). The RI Report, presented herein, provides a comprehensive presentation and analysis of the RI data.

This RI Report represents a revision of the version that was submitted in July 2013 and was subsequently approved by USEPA on August 12, 2013. The revisions made herein do not reflect any changes in content from the July 2013 and have been made solely to correct minor typographical errors and also updates to the document format.

1.1 Authority

The site was placed onto the National Priority List (NPL) in 1998. On May 13, 1999, Administrative Order No. II CERCLA 02 99 2015 (hereinafter referred to as the Order) was entered into voluntarily by the United States Environmental Protection Agency (USEPA) and ISP Environmental Services Inc. (ISP-ESI). ISP-ESI is currently the only potentially responsible party, among several, that has cooperated with USEPA to address the site. The stated purpose of the Order was to:

"(a)... conduct a remedial investigation ("RI") to determine the nature and extent of contamination and any threat to the public health, welfare, or the environment caused by the release or threatened release of hazardous substances, pollutants or contaminants at or from the Site; (b) to determine and evaluate alternatives, through the conduct of a feasibility study ("FS"), to remediate said release or threatened release of hazardous substances, pollutants, or contaminants; (c) to provide for the reimbursement to EPA of response and oversight costs incurred by EPA with respect to the Site; and (d) to provide for reimbursement to EPA of response costs incurred by EPA at the Site prior to the effective date of this Consent Order."

In accordance with the provisions of Section VII.25.H of the Order, the RI Report is hereby submitted. The RI report provides an analysis of the horizontal and vertical extent of mercury and other site constituents at the site in the various site media. The RI field investigation and reporting were performed by Brown and Caldwell from 2001 through 2008 under contract to and on behalf of ISP-ESI. The scope of the initial phase of the RI field investigation was performed in accordance with the USEPA-approved Work Plan documents described in Section 1.4.1. The technical objectives and scope of the Phase II RI field investigation was performed in accordance with the USEPA-approved Work Plan documents described in Section 1.4.2.

Baseline Human Health Risk Assessment (BHHRA) and Baseline Ecological Risk Assessment (BERA) have been performed in accordance with a pending amendment to the Administrative Order

Amendment. The BHHRA and BERA were performed by Geosyntec Consultants Inc. under contract to ISP-ESI and are summarized, herein. The full text of BHHRA and BERA reports are provided as Appendices P and Q, respectively.

1.2 Site Description

The LCP Chemicals, Inc. Superfund Site (hereinafter referred to as the LCP site) is located in the Tremley Point section of the City of Linden, Union County, New Jersey. The site is located along the western shore of the Arthur Kill and east of the New Jersey Turnpike as shown on Figures 1-1 and 1-2. It is accessed from the Road to Grasselli, which is reached from Linden via South Wood Avenue and Tremley Point Road. The coordinates of the approximate center of the site are Latitude 40.60832° and Longitude -74.21163°.

The site was formerly an industrial complex with chemical manufacturing operations. A mercury-cell, chlorine production (chlor-alkali) facility was operated at the site from 1955, until cessation of manufacturing operations in 1985, and included a mercury-cell chlorine process area, hydrogen gas processing plant, and sodium hypochlorite manufacturing area, as shown on Figure 1-3. The site was also used as a terminal for products produced at other facilities and various other industrial operations. In addition, a variety of tenants operated on site until the site was closed in August 1994.

The area surrounding the LCP site was historically developed for heavy industrial use, much of which is currently inactive and/or decommissioned. Primary current, active land use in the area is bulk storage and transport of petroleum products and aggregates.

Tidal wetlands are known to have existed historically in the area of the site. The placement of anthropogenic fill to raise the grade for industrial development is known to have occurred starting in the 1880s along the margins of the Arthur Kill.

1.3 Site History

1.3.1 Property Ownership

The real property parcels on which the LCP Chemicals, Inc. Superfund Site is located include City of Linden Block No. 587, Lots No. 3.01, 3.02, and 3.03. The land has a long and complex history of industrial use and property ownership. This ownership history has been researched by Keller & Kirkpatrick (2008) based on a detailed evaluation and reconstruction of the areas represented by various historic deeds that are available from public records from approximately 1909 to the present. Information regarding various property transfers and easements is presented on a series of maps by Keller & Kirkpatrick (Appendix A) and is summarized on Table 1-1. A description of the historic land ownership and easements is described on the basis of this research and on other available information.

1.3.1.1 Historic Land Ownership

The north central portion of the LCP site had a long history of industrial ownership starting in about 1880 with the Standard Chemical Works that was purchased by the Grasselli Chemical Company in 1889. Around 1924, the Grasselli Dyestuff Corporation, which is reported to have been a joint venture of Grasselli Chemical and Bayer AG, was incorporated under the laws of the State of Delaware.

The Grasselli Chemical Company transferred a number of large parcels to the Grasselli Dyestuff Company on October 20, 1928 which included, in part, the northern portion of what became the LCP property. Parallel property transfer records indicate duPont purchased the property in 1928. The

property transfer record indicates this same area was transferred by Grasselli Chemical Company to E.I. duPont de Nemours and Company (duPont) on November 30, 1928. In addition, a strip of property extending to the Arthur Kill east of the tracks was also transferred to Grasselli Dyestuff Company that would later be used for relocation of South Branch Creek.

Grasselli Dyestuff Corporation changed its name to General Aniline Works, Inc. on February 27, 1929. The company then changed its name to General Aniline & Film Corporation on October 30, 1939 and merged into American I.G. Chemical Corporation on October 31, 1939[1].

In 1942, the United States Justice Department seized American I.G. Chemical Corporation as a war asset. While under government control, the General Aniline & Film Corporation completed construction of a chlor-alkali (chlorine manufacturing) plant on the LCP site in 1955. In 1965 the U.S. Government sold the ownership of General Aniline & Film Corporation in a public stock offering. General Aniline & Film Corporation changed its name to GAF Corporation on April 24, 1968.

Other parcels in what became the LCP property were acquired separately. The central portion of the LCP property located west of the railroad tracks was owned by E.I. duPont de Nemours and Company prior to 1949 and transferred to General Aniline & Film Company in 1949. The southern portion of the LCP property located west of the railroad tracks was transferred from Central Railroad Company of New Jersey to General Aniline & Film Company in 1958. A narrow strip of land along what is now the current southern property line and extending to the extreme eastern tip was transferred from Central Railroad Company of New Jersey to General Aniline & Film Company in 1967.

GAF Corporation sold the LCP Site which included the chlor-alkali facility to Linden Chlorine Products, Inc. of Edison, New Jersey on August 24, 1972. LCP Chemicals and Plastics, Inc. conveyed its property to LCP Chemicals-New Jersey, Inc. on December 14, 1979. At some point, the company became known as LCP Chemicals, Inc., a division of the Hanlin Group, Inc.

1.3.1.2 Easements

Numerous easements have been established at the LCP site. These easements include various rights of way for physical access by road and rail to the LCP site, use of utility poles and other utilities, use of the flume and outfall ditch for wastewater drainage, easements for numerous underground and overhead utility lines not specifically related to the LCP site including a historic sanitary sewer trunk line; gas and petroleum transmission lines; water lines; electric lines, access to leaseholds within the LCP site property; and access to other neighboring properties. These easements are listed on Table 1-1.

1.3.1.3 Site Operation

GAF began the chlorine operation at the LCP site in 1955. By 1956, the core of the buildings required for the chlorine productions were present, including Buildings 220 and 230. GAF had stopped operation of the chlor-alkali manufacturing facility in 1971. Linden Chlorine Products, Inc., which was founded in 1972, purchased the site from GAF and subsequently resumed operation of the plant. Another mercury cell building (Building 240) and other site buildings were added by LCP in the early 1970s.

As of 1975, Linden Chlorine Products, Inc. reported that it owned no other manufacturing facilities and that only three products were produced – chlorine, sodium hydroxide, and hydrogen. By the early 1980's, the company had acquired additional chlor-alkali manufacturing facilities, including sites in Syracuse, New York, Moundsville, West Virginia, and Brunswick, Georgia.

[1] The merger into American I.G. Chemical Corporation in 1939 is reported in the deed research by Keller & Kirkpatrick. Other records suggest that ownership by American I.G. Chemical Corporation may have occurred in approximately 1928 or 1929.

Portions of the LCP site were leased to other companies for the operation of other related manufacturing operations at the site. In 1957, part of the property to the west, was leased to Union Carbide Corporation (UCC) to be used as a hydrogen plant utilizing the by-products of the chlorine plant and is known as the Linden Division hydrogen plant. UCC operated its plant through 1990. Kuehne Chemicals, Inc. leased the northern portion of the property in 1972 and opened a sodium hypochlorite manufacturing plant, which also distributed and sold chlorine.

The ownership of the Linden Chlorine Products, Inc. facility became LCP Chemicals-New Jersey, Inc., a subsidiary of Linden Chemicals & Plastics, Inc. The chlor-alkali manufacturing operations had ceased by 1985 and the facility was used as a terminal for products produced at other locations.

Hanlin Group, Inc., d.b.a. LCP, filed a petition under Chapter 11 of the bankruptcy code in 1991 and liquidated all of its assets before April 1994 using the proceeds to pay creditors including the USEPA. The Linden, New Jersey property was abandoned by Hanlin Group pursuant to an order of the Bankruptcy court and ownership reverted back from the bankruptcy estate. Title to the property is currently is listed as LCP-Chemicals New Jersey, a d.b.a. name for Hanlin. Hanlin was formerly incorporated in New Jersey but is now a defunct corporate entity.

In August 1994, the EPA conducted a site visit and confirmed that the chlorine process buildings were decommissioned, the facility was no longer functional and that the site was vacated by LCP employees. Active Water Jet Inc., a pipe cleaning company, who was a tenant at the site since about the early 1990s, remained onsite until 2000. The facility has remained abandoned ever since.

1.3.2 Operations and Development

The text in this section has been adapted from the document titled "Work Plan, Remedial Investigation and Feasibility Study" (URS, October 6, 2000) and updated with information that has been obtained from other available sources. Much of the historic information presented, herein, is compiled from documents dating back to 1975 and earlier. Within these documents there are some contradictions concerning the past operations of the site. This problem is compounded by the fact that much of LCP Chemicals, Inc.'s records were lost or destroyed sometime in the 1980s (Eder, September 1993).

At the time of LCP Chemicals, Inc.'s mercury cell chlorine production, there were three main operating centers at the site; the mercury cell chlorine process area, the hydrogen gas processing plant, and the sodium hypochlorite manufacturing area. Materials needed for processing were shipped in by barge, rail, or by truck. Storage and distribution of chlorine and its related products (including methylene chloride and potassium hydroxide) occurred on this site throughout its history. The manufacturing operations were subject to periodic shutdowns due to changes in market demands for chlorine production. The processes by which the chlorine and its by-products were created are described in the section below.

1.3.2.1 Mercury Cell Chlorine Process Area

The mercury cell was an industrial system that split common salt molecules (NaCl) to produce chlorine gas. A typical mercury cell process used electrolysis to split the salt solution. An electric current was passed through the salt solution (brine) between a graphite anode and a mercury cathode (Figure 1-4) to produce chlorine gas and sodium. The sodium dissolved into the mercury and the sodium-mercury mixture was made to react with water to produce sodium hydroxide and hydrogen gas. All of the material from this process, including the spent brine, hydrogen gas and sodium hydroxide, contained residual amounts of mercury. The mercury was separated from the resulting chlorine and hydrogen gas and sodium hydroxide which were packaged for sale for additional processing and/or for distribution.

The raw materials used in the chlorine production process were salt, water, mercury, and electric power. Documentation of LCP Chemicals, Inc.'s procedure for the handling and storage of chemicals is not available. Rock salt or evaporated salt, which was utilized later, was transported to the site by rail. It was stored in salt silos located by Building 233 (Figure 1-3) and fed to the adjacent saturators to create brine. The brine was treated and filtered in a brine treatment tank in Building 233. To treat the brine, sodium hydroxide, sodium carbonate, and barium chloride were added to precipitate impurities in the solution, such as calcium carbonate, sulfates, and hydroxides. The residual material is known as brine purification mud or "brine sludge". In the mid 1960s, a surface impoundment, the brine sludge lagoon, was constructed and used to dispose the brine sludge and process wastewater. The sludge was mixed with brine and the resulting slurry was pumped to the brine sludge lagoon through overhead pipes. The supernatant, or liquid content of the brine sludge lagoon, was pumped back to the brine purification tank for recycling and for redistribution either to the mercury cells or for the slurry usage. Documentation of the disposal practices for the brine sludge before the construction of the sludge lagoon is not available.

After pre-treatment of the brine, it was piped to the mercury cells in Building 230 and Building 240 to produce gaseous chlorine and a mercury sodium mixture through electrolysis. Once the chlorine was cooled, dried (i.e., water vapor removal) with sulfuric acid, and liquefied in Building 233, it was stored in 100 ton vessels. The used brine was recycled to the treatment tank in Building 233 for re saturation and to repeat the process.

The mercury-sodium mixture was then piped to denuders, or strippers, where it was hydrolyzed to form elemental mercury, a sodium hydroxide solution and gaseous hydrogen. The recovered mercury was returned to the mercury cells. The sodium-hydroxide solution was filtered and stored in above ground storage tanks at the northeast corner of the facility. The hydrogen gas was also filtered by way of a commercial "Purasiv" unit south of Building 231. From there it was piped to the hydrogen facility where it was packaged and distributed by Union Carbide (Linde Division). Occasionally, the hydrogen gas was mixed with water and chlorine to form hydrochloric acid in both gaseous and liquid form. The hydrochloric acid was then stored in tanks near Building 231. In 1985, LCP Chemicals stopped the mercury cell process, thus brine sludge production was also stopped.

Between 1985 and 1994, the site was used as a transfer terminal for products made at other Hanlin Group Facilities. The Hanlin products were shipped to the site via rail or truck and stored in above ground storage tanks. From there they were repackaged and distributed. The products were potassium hydroxide, sodium hydroxide, hydrochloric acid and methylene chloride. Aerial photographs of the facility during full operation in 1966-67 (Building 240 not constructed yet) and shortly after shut down of the mercury cell process are shown on Figures 1-5 and 1-6, respectively.

1.3.2.2 Linde Division Hydrogen Plant

The hydrogen plant was operated by the Linde Division unit of Union Carbide Corporation (Linde) which occupied a 2.1-acre leasehold on the western portion of the site (Figure 1-3) interconnected to the mercury cell process area. The Linde Division hydrogen plant started operation in 1957 and ceased operation in 1990. Hydrogen was supplied from the mercury cells to the plant via overhead pipes. The gas was purified by UCC to remove additional residual mercury (reportedly, at least five pounds of mercury was removed from the gas stream by Linde daily), stored, compressed, and shipped by trailer. Union Carbide, in their 104(e) response claims that one disposal method for the Linde waste mercury was to give it to employees for resale. In 1980, the hydrogen plant stopped using the hydrogen from the chlorine plant, and began to package liquid cryogenic hydrogen that was shipped in from outside sources.

In 1988, in preparation for a new tenant, UCC had the building interior and the hydrogen compressors decontaminated for mercury (IT, April 22, 1988). IT reportedly recovered 30 pounds of free mercury from one compressor and its associated piping.

In May 1990, the Linde Division plant ceased operations after the UCC lease with LCP expired. This triggered the NJDEP's Environmental Cleanup Responsibility Act (ECRA, now known as ISRA). Due to several areas of concern unrelated to the chlorine manufacturing process (i.e., former underground storage tanks, sumps, septic tanks, etc.), ISRA required that a soil and groundwater investigation be conducted within the boundaries of the site. The required investigation and its cleanup took place in the early 1990s. The NJDEP granted a No Further Action (NFA) declaration for the hydrogen facility on June 20, 1995 for soils only. To our knowledge, Praxair (successor to UCC) has had engineering controls on the leasehold.

The Linde Division facility was last used in October 1994 by Liquid Carbonic Corporation. Liquid Carbonic Corporation was later purchased by Praxair, Inc. Liquid Carbonic rented the Linde Division site from LCP Chemicals, Inc., and used it for office space and as a parking area for truck trailers.

1.3.2.3 Hypochlorite Facility

Kuehne Chemical, Inc., leased Lot Nos. 3.02, 3.03 and the northern part of Lot 3.01 from LCP Chemicals, Inc. and started a sodium hypochlorite manufacturing process. The processing area was located to the north of Building 220 and between Avenue C and D and consisted of above ground storage tanks, loading areas and support buildings (Figure 1-3). The manufacturing plant received its raw materials, chlorine and sodium hydroxide, from the LCP chlorine plant via overhead pipes. The raw material were utilized by Kuehne to produce sodium hypochlorite (bleach). Chlorine, sodium hydroxide, hydrochloric acid, and sodium hypochlorite were also stored and distributed by Kuehne. Kuehne Chemical Inc. had vacated the site by February 1981. It is likely Kuehne mercury waste was disposed of along with the LCP mercury waste.

1.3.2.4 Other Operators

Conrail (successor to Central Railroad of New Jersey) constructed and operated a railroad line and railroad yard across the property as described in Section 2.1.1 and as shown on Figure 2-8.

Active Water Jet operated a pipe and tank washing operation on the property from 1990 until 2000. Active Water Jet cleaned, with water blasting, contaminated tanks, filters, pipes, condensers and similar items. Its offices were located in building 220.

Caleb Brett leased a portion of the property from 1988 to 1995; they are known to have stored petroleum crude oil, No. 6 fuel oil, kerosene, asphalt products, pot ash, caustic soda, alcohol, and ketones at the site.

Microcell Technologies leased building 231 from 1987 until 2000 and operated a pilot plant that produced small glass spheres.

1.4 RI Site Investigation

The work plan documents and the technical objectives for each of the RI field investigations are described below.

1.4.1 Phase I RI

Phase I RI Work Plan Documents

The Phase I RI was performed during 2001 and 2002 in accordance with the following USEPA-approved documents:

1. "Work Plan, Remedial Investigation and Feasibility Study" (URS, October 6, 2000).
2. "Final Sampling and Analysis Plan, Field Operations Plan, Part I, Draft Sampling and Analysis Plan" (URS, April 12, 2001), hereinafter referred to as the FOP.

3. "Quality Assurance Project Plan, Field Operations Plan, Part II, Draft Sampling and Analysis Plan" (URS, February 12, 2001), hereinafter referred to as the QAPP.
4. "Addendum No. 1, Field Operations Plan for the LCP Chemicals, Inc. Superfund Site, Cased Deep Borings," (Brown and Caldwell, October 12, 2001).
5. "Addendum No. 2, Field Operations Plan for the LCP Chemicals, Inc. Superfund Site, Subsurface Utility Clearance," (Brown and Caldwell, November, 2001).
6. "Addendum No. 3, Field Operations Plan for the LCP Chemicals, Inc. Superfund Site, Sampling Beneath Buildings 230 and 240" (Brown and Caldwell, March 2002).

Agency approval of these Phase I RI Work Plan documents was provided in letters from USEPA in 2001 and 2002.

Phase I RI Objectives

The objectives of the Phase I RI were stated in Section 2 of the "Final Sampling and Analysis Plan, Field Operations Plan, Part I, Draft Sampling and Analysis Plan" (URS, April 12, 2001):

- Determine the nature and extent of contamination in the soil, groundwater, surface water, and sediment.
- Evaluate stratigraphy on a site-wide basis - confirm the distribution of the Tidal Marsh Deposit and evaluate its effectiveness as a confining layer.
- Define the hydrogeology on a site-wide basis - confirm groundwater gradients, flow directions, and aquifer properties (e.g., hydraulic conductivity, transmissivity, etc.) to predict the direction and flow rate of groundwater contaminant migration.
- Evaluate tidal effects on groundwater and groundwater flow direction.
- Evaluate the potential ecological resources of, and impacts to, South Branch Creek.
- Characterize anthropogenic fill at the site.
- Develop a conceptual site model.
- Determine risks posed to human health and environment.

The results of the Phase I RI field investigation were presented in the document titled, "Site Characterization Summary Report (SCSR), LCP Chemicals Superfund Site, Linden, New Jersey", (Brown and Caldwell, August 2002).

1.4.2 Phase II RI

Phase II RI Work Plan Documents

The Phase II RI was performed from August 2006 through June 2007 in accordance with the following 14 USEPA-approved documents:

1. "Work Plan, Remedial Investigation and Feasibility Study" (URS, October 6, 2000).
2. "Final Sampling and Analysis Plan, Field Operations Plan, Part I, Draft Sampling and Analysis Plan" (URS, April 12, 2001), hereinafter referred to as the FOP.
3. "Quality Assurance Project Plan, Field Operations Plan, Part II, Draft Sampling and Analysis Plan" (URS, February 12, 2001), hereinafter referred to as the QAPP.
4. "Addendum No. 1 (Soil and Groundwater) Work Plan: Phase II Remedial Investigation, LCP Chemicals, Inc. Superfund Site", (Brown and Caldwell, July 2004, Revised April 2006, Revised October 2006).

5. "Addendum No. 2 (South Branch Creek & Ecological Issues) Work Plan: Phase II Remedial Investigation, LCP Chemicals, Inc. Superfund Site", (Brown and Caldwell, July 2004, Revised August 2006, Revised October 2006).
6. "Addendum No. 1, Field Operations Plan for the LCP Chemicals, Inc. Superfund Site, Cased Deep Borings," (Brown and Caldwell, October 12, 2001).
7. "Addendum No. 2, Field Operations Plan for the LCP Chemicals, Inc. Superfund Site, Subsurface Utility Clearance," (Brown and Caldwell, November, 2001).
8. "Addendum No. 3, Field Operations Plan for the LCP Chemicals, Inc. Superfund Site, Sampling Beneath Buildings 230 and 240" (Brown and Caldwell, March 2002).
9. "Addendum No. 4, Field Operations Plan, LCP Chemicals, Inc. Superfund Site (Bedrock Monitoring Wells, Soil Vapor Testing, Groundwater Sampling)", (Brown and Caldwell, April 2006, Revised October 2006).
10. "Addendum No. 5, Field Operations Plan for the LCP Chemicals, Inc. Superfund Site, Ecological Sampling", (Brown and Caldwell, August 2006, Revised October 2006).
11. "QAPP Addendum for South Branch Creek Sampling," (Brown and Caldwell, August 2006, Revised October 2006).
12. "Supplemental Work Plan: Sediment Toxicity Testing (South Branch Creek), Phase II Remedial Investigation LCP Chemicals, Inc. Superfund Site," (Brown and Caldwell, September 2006, Revised October 2006).
13. "Interim Ecological Risk Assessment Problem Formulation," (Brown and Caldwell, Revised October 2006).
14. "Health and Safety Plan For Phase II Remedial Investigation at the LCP Chemicals, Inc. Superfund Site," (Brown and Caldwell, September 2006).

Agency approval of these Phase II RI Work Plan documents was provided in the following:

- Letter from Ms. Carole Petersen of USEPA dated September 13, 2006 referenced: "Conditional Approvals for Addendum No. 2 (South Branch Creek and Ecological Issues) Work Plan: Phase II Remedial Investigation, LCP Chemicals, Inc. Superfund Site (Revised July 2006); and Addendum No. 5 Field Operations Plan LCP Chemicals, Inc. Superfund Site (Ecological Sampling) (August 2006)."
- Letter from Ms. Carole Petersen of USEPA dated October 5, 2006 referenced: "Conditional Approvals for Addendum No. 1 (Soil and Groundwater) Work Plan: Phase II Remedial Investigation, LCP Chemicals, Inc. Superfund Site (April 2006) and Addendum No. 4 Field Operations Plan, LCP Chemicals Inc. Superfund Site (Bedrock Monitoring Wells, Soil Vapor Testing, Groundwater Sampling) (April 2006)."
- Submittal of revised Phase II Work Plan documents to USEPA by October 13, 2006 in accordance with the conditions set forth in the conditional approval letters.

Phase II RI Objectives

The Phase II RI Work Plan included an approach and methodology to address the following technical objectives:

- Additional delineation of surficial and shallow soils in the western area of the site through the installation and testing of soil from a number of borings.
- Characterization of deep soils through the installation and testing of a number of borings to determine the vertical extent of contamination identified in the shallow soils.
- Characterization of soil quality within the glacial till beneath Building Nos. 230 and 240.

- Determination of the presence of methyl mercury in soil from a number of shallow and deep soil samples obtained in various areas of the site.
- Determination of the specific form of mercury in a number of surficial soil samples including mercuric (Hg+2), mercurous (Hg2+2), and methyl (CH3Hg+).
- Characterization of surficial soil quality near storage tanks remaining at the site that may have had potential releases to the environment.
- Determination of groundwater quality in the bedrock water-bearing zone.
- Additional characterization of groundwater quality in the overburden water-bearing zone through the collection of a second complete round of monitoring well samples, including the use of "ultra-clean" sample collection and handling techniques for mercury.
- Determination of the groundwater flow characteristics in the bedrock water-bearing zone.
- Additional characterization of groundwater flow conditions in the overburden water-bearing zone.
- Determination of the in-place hydraulic conductivity of the unconsolidated and consolidated geologic material screened by the newly installed monitoring wells.
- Determination of the presence of methyl mercury in groundwater from a number of overburden and bedrock groundwater samples obtained in various areas of the site.
- Characterization of soil vapor to address the potential vapor intrusion pathway to future building structures at the site.
- Current wetland delineation and jurisdictional determination.
- Additional delineation of selected constituents in sediment and surface water in South Branch Creek as well as in the confluence area of South Branch Creek and Arthur Kill to address ecological concerns.
- Evaluation of the bioavailability of mercury in the surface water and sediment within South Branch Creek. This includes a determination of the ratio of methyl mercury to total mercury.
- Determination of the influence of mercury speciation and sediment chemistry on bioavailability to aquatic organisms.
- Utilization of a Reference Channel for the purpose of differentiating certain chemical constituents with respect to the background conditions when performing environmental characterization and analysis.2
- Estimation of biota sediment accumulation factors (BSAFs) from sediment to crabs and fish.
- Collection of site-specific information to support the Baseline Ecological Risk Assessment, including a biologic habitat assessment and the collection of tissue residue in selected aquatic biota in South Branch Creek and the confluence area of South Branch Creek and Arthur Kill.
- Evaluation of sediment toxicity.

1.4.3 Off-Site Ditch Investigation

Off-Site Ditch Work Plan Documents

The off-site ditch investigation phase of the RI was performed from July 22, 2011 to July 28, 2011 in accordance with the following two USEPA-approved documents:

---

2 The Phase II RIWP documents, dated October 2006, included tasks for the selection and collection of samples from a reference stream. An e-mail message dated August 18, 2006 from Mr. Jon Gorin of USEPA to ISP-ESI that stated " . . . after consulting with BTAG, we've determined that there is no need for a reference stream right now." The approved documents included identification and sampling of a reference stream. This work was therefore conducted in accordance with the approved documents without oversight by USEPA.

- "Revised Scope of Work - Characterization of Off-Site Ditches, LCP, Chemicals Inc. Superfund Site", (Brown and Caldwell, May 14, 2010).
- "Quality Assurance Project Plan, LCP Chemicals, Inc. Superfund Site, Linden, New Jersey", (Brown and Caldwell, May 2010).

Off-Site Ditch Work Plan Objectives

The Off-Site Ditch Scope of Work included an approach and methodology to address the following technical objectives:

- To characterize the extent to which the Northern and Southern Off-Site ditches are tidally influenced.
- To characterize the extent to which the Northern and Southern Off-Site ditches may be impacted by site-related constituents.

1.5 Report Organization

The data presented in this RI Report includes the Phase I and II RI data and is intended to characterize current site conditions for each medium that was investigated. The environmental database (Appendix F) contains the complete laboratory analytical data from both the Phase I and Phase II RI field investigations.

The RI Report is organized as follows:

- Section 1 Introduction
- Section 2 Site Setting
- Section 3 RI Field Investigation Methods and Procedures
- Section 4 Data Management
- Section 5 Physical Characteristics
- Section 6 Nature and Extent of Contamination
- Section 7 Contaminant Fate-and-Transport
- Section 8 Baseline Risk Assessment Summary
- Section 9 Recommendations
- Section 10 References

Appendices to the RI Report are as follows:

- Appendix A Property Transfers
- Appendix B Field Operations Plan
- Appendix C Well Construction and Soil Boring Logs
- Appendix D Hydrogeologic Data
- Appendix E Wetland Delineation
- Appendix F Habitat Assessment Report
- Appendix G Representative Photographic Logs
- Appendix H Analytical Lab Deliverables (DVD)
- Appendix I Data Usability Reports
- Appendix J Tabular Summary of Analytical Data
- Appendix K Environmental Database (CD-ROM)
- Appendix L Sediment Toxicity Testing Report

- Appendix M Regional Studies
- Appendix N NJDEP Technical Regulations Checklist
- Appendix O Human Health Risk Assessment
- Appendix P Ecological Risk Assessment

Section 2

Site Setting

The LCP Chemicals Inc. Superfund Site (LCP site) is located in the Tremley Point section of the City of Linden, Union County, New Jersey as shown on Figure 1-1. The site is located along the western shore of the Arthur Kill and east of the New Jersey Turnpike. It is accessed from the Road to Grasselli which is reached from Linden via South Wood Avenue and Tremley Point Road. The coordinates of the center of the site are Latitude 40.60832° and Longitude -74.21163°.

The LCP site property includes Block 587, Lots 3.01, 3.02, and 3.03. The area of these three lots totals approximately 26 acres. The shape of the property is highly irregular with a maximum east-west dimension of approximately 2,500 feet and a maximum north-south dimension of 1,600 feet (Figure 1-3).

The site is bisected by an inactive railroad spur running north and south that is located on an easement and is operated by the Consolidated Rail Corporation (Conrail). The LCP chlor alkali manufacturing facility was formerly housed in a group of buildings located immediately west of the railroad tracks. The mercury cell buildings (No. 230 and 240) and the liquefaction building (No. 231) are shown on Figure 1-3.

The current alignment of a man-made ditch, known as South Branch Creek, is located east of the railroad tracks along a narrow portion of the property that connects to the Arthur Kill. Occupying most of the remaining portion of the property east of the railroad tracks is a closed RCRA unit, a cooling tower, and the pad for a former sludge roaster. The closed RCRA unit is currently maintained by ISP-ESI.

West of the railroad tracks there are numerous buildings and tanks associated with the LCP Chemicals Inc. facility and its tenants. Several of the buildings also exist on the property that were part of associated processes leased and operated by other companies, including the Linde hydrogen plant predominantly on the western portion of the property, and the Kuehne Chemicals sodium hypochlorite and chlorine packaging facility. Other notable site features on the western portion of the site include an electrical transformer and rectifier yards and an on-site railroad yard. Additionally, engineering and institutional controls consisting of a 0.7 acre asphalt cap and deed restriction were placed on the western portion of the property by former tenant Linde in 1994 pursuant to the New Jersey Environmental Responsibility Act (ECRA) Site No. 90367. This engineering control installed by Linde, the cap, has not been inspected or maintained by Linde or its successors, including Praxair to the knowledge of ISP-ESI, at any time after installation in 1994. The cap is currently in disrepair with major cracks and trees growing out of it. NJDEP, EPA and Praxair have been notified of this situation on several occasions.

The LCP site started chlor-alkali manufacturing operation in 1955 and the core of the manufacturing buildings were present by 1956. Cell Building 240 was added in 1972. Manufacturing of chlorine ceased at the facility by August 1985 and site operation by LCP ended by August 1994; several tenant operators remained until 2001. Additional information regarding the site history, including site operation and development is presented in Section 1.3.

The southern LCP property is adjacent to a pair of parallel railroad tracks operated by Conrail, and further south by two parallel drainage channels hereinafter referred to as the Northern and Southern Off-Site Ditches. The two ditches run parallel with the southern LCP property line, and are not apparently associated with development on the LCP site.

2.1 Land Use and Zoning

The area surrounding the LCP site historically was developed for heavy industrial use, much of which is currently inactive. A map depicting land use as of 2002 is presented in Figure 2-1. The map was developed based on GIS datalayers obtained from the New Jersey Department of Environmental Protection (NJDEP).

The current primary active land use in the area is bulk storage and transport of petroleum products and aggregates. The transport of these materials occurs by ship and barge using dockage along the Arthur Kill as well as by rail, truck, and pipeline. Other active facilities in the area include a municipal wastewater treatment plant, trucking and warehousing, and truck repair. An active, major rail freight line runs parallel to the eastern side of the New Jersey Turnpike, west of the site. A number of large chemical manufacturing facilities formerly operated within one mile of the site, most of which are currently inactive and in various stages of demolition and site remediation.

The industrial properties located immediately adjacent to the LCP site include:

- NuStar Energy Linden Terminal located north and south of South Branch Creek to the east of the inactive Conrail railroad spur.
- The former GAF site manufacturing facility to the north.
- Citgo Petroleum Corp, Linden Transload Terminal located to the south and southwest.
- Linden-Roselle Sewerage Authority (LRSA) sludge barge dock located southeast of the site along the Arthur Kill.

Various undeveloped areas are located within one mile of the site, many of which are either vacant former chemical manufacturing plants or tidal wetlands. The former manufacturing areas are depicted on the Land Use map (Figure 2-1) either as "Industrial", "Undeveloped/Barren/Field", and/or "Scrubland". Areas of tidal wetlands, some of which are partially filled, are located along the Rahway River to the south and Piles Creek to the north. Pralls Island is located northeast of the site and across the Arthur Kill in Richmond County, New York and is a wildlife sanctuary consisting of dredge spoil fill placed over former tidal wetlands. The City of New York, Department of Sanitation Fresh Kills Landfill, is located approximately three miles south of the site.

Most of the currently or formerly developed land in the vicinity is located on what has been mapped by the New Jersey Geologic Survey (2005) as "Historic Fill" in accordance with N.J.S.A. 58:10B-1 et seq. Additional information regarding anthropogenic fill is presented in Section 1.3.2.

The only area of residential development within one mile of the site is the Tremley section of Linden which is located west of the New Jersey Turnpike approximately 3,850 feet (¾ mile) from the nearest (western) edge of the LCP site.

2.1.1 Anthropogenic Fill

The entire area of the LCP site and most of the area surrounding the site formerly consisted of tidal wetlands, as depicted on historic topographic maps in Figures 2-2 through 2-4. It was necessary to raise the grade prior to the historic development of these areas for industrial and other uses. This was accomplished through the placement of non-indigenous materials, that is, materials not originally native to the tidal wetlands, including soil, ash, dredge spoil, demolition debris, and other materials. This material is referred in this report as "anthropogenic fill", namely, fill material that has been placed by humans. The placement of fill in the Tremley Point area allowed for the industrial development of the peninsula.

Historic Placement of Anthropogenic Fill

The presence of anthropogenic fill at the site has been verified by evaluation of soils encountered as part of the extensive soil boring program, which was completed as part of Phase I and II of the RI, as well as prior subsurface investigations conducted by others. This observation has been independently confirmed through an evaluation of the historic placement of anthropogenic fill identified on available historic maps and aerial photographs. Briefly, these sources (Figures 2-5 through 2-17) reveal that the entire area, formerly occupied by tidal marsh, was progressively filled. A chronologic description of the placement of anthropogenic fill is described below.

Historic topographic mapping from 1898 (Figure 2-2) reveals that the entire LCP site was formerly occupied by tidal wetlands that were contiguous with the Arthur Kill. In fact, the only nearby area that was not wetland is the slightly elevated land along Tremley Point Road.

Early industrial development occurred immediately along the margin of the Arthur Kill with the construction and operation of the Standard Chemical Works and later the Grasselli Chemical Company. This presence of the Grasselli Chemical Company is evident on the 1898 topographic map (Figure 2-2).

Aerial photography as of May 8, 1929 (Figures 2-5 and 2-6), reveal what appeared to be extensive filling in the Grasselli East Works area (east of railroad tracks). This land was owned immediately prior to this time by the Grasselli Chemical Company and was later acquired by duPont, with a narrow strip owned by Grasselli Dyestuff Company. The fill was also identified as far south as South Branch Creek, evident by the apparent steep banks on either side of the creek located north of the LCP property (Figure 2-5). The area west of the tracks had apparently not yet been filled.

Available aerial photography from April 28, 1940 reveals extensive areas of filling located on what was likely the duPont property at the time located east of tracks (Figure 2-8). These areas include north and south sides of South Branch Creek between the confluence with Arthur Kill and the eastern-most railroad track, a triangular area immediately south of South Branch Creek and immediately east of the western railroad tracks, and the large area located north of South Branch Creek. Other areas may be filled, including the entire area of the future LCP property east of the tracks, although this is not completely clear from the photograph.

By 1940 the south-western portion of the future LCP property between the railroad tracks was filled in preparation for the construction of a railroad yard (Figure 2-8). This railroad yard was on property that was owned at the time by the Central Railroad Company of New Jersey (Figure 2-11).

An irregular area is evident on the 1940 photograph (Figure 2-8) that appears to have been filled. This possible fill area was located on property owned by duPont that was located immediately north of railroad track, contiguous with South Branch Creek. The area immediately north of South Branch Creek is apparently not filled, as well as the far southeast corner of the future LCP property (west of the tracks).

By July 1947 (Figure 2-10), aerial photographs reveal that the northern portion of the property is covered with raw material piles on property owned by General Aniline & Film Corporation. These material piles and decommissioned process equipment storage yard are located in an area that has obviously been filled. South Branch Creek has now been re-routed to a position further south.

The old alignment of South Branch Creek is evident in the photographs from 1951 in which it and the area surrounding it are in the process of being filled (Figures 2-11 and 2-12). This is located on land that had been acquired by General Aniline & Film Corporation from duPont just shortly before in 1949. The northwestern most corner of the LCP property is partially filled along what appears to be a road leading to the western portion of the GAF facility. A strip of empty land immediately to the south is apparently not yet filled.

As of July 17, 1952, aerial photography indicates that the northern portion of the property remains covered with raw material piles and a process equipment storage yard in an area that has obviously been filled. South Branch Creek has now been re-routed to a position further south. The old alignment of South Branch Creek is still evident in the photograph in which it and the area surrounding it have been filled. The new (southern) alignment of South Branch Creek is evident. The entire western portion of the LCP property has now been filled. The most recent area of filling is partially covered with rows of equipment (Figure 2-12). In a photograph dated May 16, 1954 (Figure 2-13), the entire site east of the tracks appears to have been filled.

In summary, most filling of the LCP property was performed over a long time span likely starting around 1885. Much of the filling occurred by various owners prior to the development of the site for chlor alkali production. Most, but not all of the property, appears to have been filled by 1949.

2.1.2 Regional Industrial History

A brief description of some of the major industrial occupants of the Tremley Point area is presented below. Information contained herein was obtained from NJDEP files, the attached title search summary, or was provided by the property owner. ISP-ESI has not conducted an independent investigation of any of these properties or their operations. The historic regional land use circa 1940 is presented in Figure 2-3.

Former GAF Chemicals Manufacturing Facility

The former GAF Chemicals manufacturing facility, now referred as the GAF site, was first utilized for chemical manufacturing in approximately 1919. Under the various ownerships, chemical products were manufactured at the GAF site from approximately 1919 until closure of the plant in April 1991. Products manufactured at the GAF site primarily consisted of dyestuffs and surfactants, but also included ethylene oxide, tetrahydrofuran and herbicides. The plant ownership and various corporate entities are described in Section 1.3.1. The current owner of the site is Linden Property Holdings LLC.

The GAF site has been remediated. The site remediation conducted to-date has included demolition of site structures, capping, grading and drainage improvements, construction of a shallow groundwater barrier and groundwater collection system, installation of bedrock groundwater extraction wells, LNAPL collection and the construction and operation of a groundwater conveyance and treatment system. NFA letters have been received for site-wide soils and groundwater from the NJDEP. Remedial Action Permits for Groundwater (Permit ID RAP110002) and Soil (Permit ID RAP110001) became effective at the GAF Site on February 22, 2012.

The environmental conditions at the GAF site were documented in a comprehensive Remedial Investigation Report (Eckenfelder, 1991). Raw materials and associated bi-products from the former GAF operations are reported to have included arsenious acid catalysts, arsenic acid, arsenic mercuric sulfate, and mercury oxide catalysts among numerous other organic and inorganic constituents. The predominant organic constituents in soils and groundwater include various VOCs and SVOCs, including chlorobenzene, benzene, 1,2-dichlorobenzene, 1,4-dichlorobenzene, naphthalene, 4-chloroaniline, and phenol. The most prominent inorganics in soils and groundwater were mercury, chromium, and arsenic. These constituents are widely distributed across the entire Site with the highest levels observed in the "Old Landfill" and in the former production area. In fact, dissolved mercury concentrations range as high as 2,520 µg/L in the bedrock water-bearing zone.

A groundwater barrier wall formed of sealed-joint, steel sheet piling (Waterloo Barrier) was installed to provide hydraulic containment of shallow groundwater, and to limit the potential for contaminated soil particle migration from the site. The groundwater barrier wall spans a length of approximately

8,523 feet and surrounds an area of approximately 104 acres. Its alignment encompasses the former main plant site of the GAF site (Figure 2-18). The wall penetrates miscellaneous fill materials and is keyed into the underlying organic silt and clay aquitard and/or the glacial till formation.

A shallow groundwater collection system is installed just inside the barrier wall to intercept and control potentially contaminated shallow groundwater and percolations above the aquitard and direct these waters to the on-site wastewater treatment plant. This shallow groundwater collection system, in conjunction with the barrier wall, controls the interior shallow groundwater elevation, such that intragradient conditions (i.e., hydraulic head on the inside of the barrier wall is below that on the outside) prevail along the length of the barrier wall, thus containing shallow groundwater within the limits of the barrier wall and controlling the lateral migration of groundwater from the GAF site. This system consists of a collection drain situated essentially parallel to and a short distance inside the barrier wall alignment. The drain includes a 15-inch diameter high density polyethylene perforated pipe surrounded by drainage stone, which is wrapped in a geotextile blanket. A series of 26 precast concrete manholes serve as inspection and maintenance points along the length of the drain. Collected waters within this system are directed to two pumping stations, each consisting of an above-grade pump house situated over a precast concrete collection sump. Each pump station is equipped with a primary and backup pump, liquid level sensors and controls to operate the pumps and maintain groundwater at the desired elevation. Water discharged from each pump station is conveyed to the WWTP.

A bedrock groundwater extraction system provides areal hydraulic capture of the GAF site. Primary hydraulic capture of the majority of the site is provided by two wells located on the eastern edge of the site, DEW-2 and DEW-4A (Figure 2-18) with well screen intervals of 45 to 65 ft bgs and 45 to 55 ft bgs, respectively. Extraction wells DEW-2 and DEW-4A are operated in a continuous pumping mode at 18-20 gpm each, and have been operational on a nearly continuous basis since 2002. Additional, minor hydraulic capture of the northern edge of the GAF site has been achieved by two extraction wells, EW-2, and DEW-2, that became operational in early 2010, at pumping rates of approximately 1 to 2 gpm each. Water from the bedrock extraction system is conveyed to the on-site waste water treatment facility.

NOPCO

A NOPCO Chemical Company ("NOPCO") chemical manufacturing site was located immediately south of the LCP site on land now occupied by NuStar Energy. The NOPCO facility is observed on a 1966 aerial photograph (Figure 2-16). NOPCO constructed a toluene diisocyanate manufacturing plant on the site in the early 1960s with an initial design capacity of 10 million pounds per year. Raw materials used in the production of toluene diisocyanate include phosgene, chlorobenzene, and dichlorobenzenes, among others. Toluene diisocyanate is used as an intermediate in the production of polyurethane. The NOPCO Linden operation was related to its "Lockfoam" product line.

NOPCO acquired the land to construct the toluene diisocyanate plant from Sinclair Refining on December 28, 1960. The plant was constructed in the early 1960s and full operation was initiated by March and April of 1963. However, the plant operations were discontinued by September 1964 after a long series of design, construction, and operational difficulties. NOPCO sold the property to Allied Chemical Corp on April 5, 1965 (NOPCO Chemical Company, 1960, 1961, 1962, 1963, 1964, 1965). NOPCO Chemical merged into the Diamond Alkali Company who shortly thereafter merged with the Shamrock Oil Company to form the Diamond Shamrock Corporation in 1967.

E. I. duPont de Nemours and Company (duPont) Site

The duPont site is currently located northeast of the LCP site along the Arthur Kill. This former chemical manufacturing site has been decommissioned and is currently in the ISRA process.

The duPont plant manufactured inorganic salts and acids, organic pesticides (including DDT), sulfuric acid, ammonium thiosulfate, and a sodium bisulfate solution. duPont used areas of surrounding marsh

for discharge of aqueous manufacturing wastes from 1928 until the mid-1970s. The wastes disposed of were from the manufacture of inorganic compounds such as phosphate plaster (CaSO4 with 2-3% phosphate residual), hypo muds (diatomaceous earth, sulfur, carbon, and rust particles), silicate muds (sand, filter aid, and minor quantities of sodium silicate), and metal sulfides. The wastes also included coal, coal ash and waste residues. Various arsenic-containing materials are reported to have been manufactured including lead arsenate, iron arsenate, and arsenic acid, in addition to various pesticides that may have included arsenic.

The parcel has been used for chemical manufacturing from about 1880 until 1990 when duPont ceased operations.

Petroleum Product Terminals

Two bulk petroleum product terminal facilities are located on properties immediately adjacent to the LCP site. The NuStar Energy-Linden Terminal is located north and south of South Branch Creek to the east of the inactive Conrail railroad spur on the property previously occupied by NOPCO. This facility has been in existence under various ownerships since the 1970s. The Citgo Petroleum Corp, Linden Transload Terminal located to the south and southwest of the site has been in existence since before 1940. These facilities receive and ship various products including petroleum distillates, gasoline, jet fuel, ethanol, and other residual fuels. The mode of product receipt includes ship, barge, rail and pipeline. The mode of delivery includes ship, barge, pipeline, and truck.

Bayway Refinery

The Bayway Refinery is located west and northwest of the LCP site. The facility is approximately 1,300 acres with a refinery, two chemical plants, tank fields, and a marketing and distribution station. The refinery has been producing petroleum products in continuous operation since 1909. The eastern border of the property abuts the western headwaters of Piles Creek. Various ownership changes have occurred over the years. Standard Oil Company purchased the Bayway property in 1907. Successors included Standard Oil of New Jersey and Exxon. More recent ownership has included Tosco Corp and ConocoPhillips. The facility is currently under an Administrative Order and has triggered ISRA several times. It is our understanding that Exxon-Mobil retains the liability for the environmental cleanup of the site.

On the eastern side of the Bayway Refinery, the New Jersey Turnpike passes through the site, separating the main refinery and process areas from the waterfront area, which borders on the Arthur Kill. Two outlying tank fields (the Rahway River Tank Field and the 40-acre Tank Field) are located southwest of the main refinery and process areas.

The west side chemical plant produces additives for motor oils and high purity propylene. Tanks on site store sulfidic caustic, asphalt, butane, gasoline additives, heavy catalytic naptha, domestic oil, gasoline, petrolite, Celsius, water white, standard white, gas oil, treated naptha, crude naptha, and crude petroleum. The east side chemical plant produced methyl ethyl ketone, tertiary butyl alcohol, secondary butyl alcohol, methyl isobutyl ketone, isopropyl alcohol, acetone, propylene, isophorone, and fuel gas. Finished products stored on site include heating oil, heavy fuel oil, jet fuel, diesel fuel, kerosene, asphalt. There is a tetraethyl lead building. Processes include calatytic cracking, naptha reforming, alkylation, and disulfurization. Early products produced on site (1914-1919) included gasoline and kerosene.

Former American Cyanamid Warners Plant

The former American Cyanamid Warners Plant was located at the tip of the Tremley Point peninsula at the confluence of the Arthur Kill and the Rahway River. The 33-acre site was built in 1916-1917 and originally produced concentrated "ammo-phos" fertilizers. During WWI, the facility produced ammonia and nitric acid for military purposes. The plant also made aluminum sulfate for water treatment and a

range of organic chemicals including rubber, motor oil additives, accelerators, fumigants (hydrocyanic acid) and pesticides. A sulfuric acid production unit started operation in 1970. The facility discontinued operations in 1998.

The site has been decommissioned and an environmental remediation has been performed under RCRA. The property has been sold and is currently awaiting redevelopment.

PSE&G

The PSE&G Linden Generating Station is a 1,526 MW natural gas powered electric power plant located along the Arthur Kill immediately north of Piles Creek. This plant replaced a former oil-fired plant that was also operated by PSE&G.

2.1.3 Current Site Land Use

Manufacturing of chlorine ceased at the LCP facility in 1985 and site operation by LCP ended by August 1994. Several tenant operators, including Active Water Jet, Inc. remained until 2000. Today, the LCP site is unoccupied and unused.

2.1.4 Zoning

The area of the site located east of the New Jersey Turnpike (NJTP) is zoned for heavy industry. Allowable uses in this area include various types of manufacturing (except explosives, fertilizers, and the use of liquefied natural gas); assembly and packaging; warehousing; airports; offices, research facilities; service stations and automotive repair shops; public utility generating stations, truck terminals and tank farms. Residential, consumer retail, and recreational development in the area located east of the NJTP is specifically not allowed.

Some of the areas located along South Wood Avenue, west of the New Jersey Turnpike, are zoned for light industry. Allowable uses for these areas would include manufacturing that employs no chemical or raw material processing, assembly and packaging operations, warehousing, airports, offices and research facilities, and service stations and automotive repair shops.

2.1.5 Anticipated Future Land Use

The Tremley Point area of Linden, located east of the New Jersey Turnpike, is anticipated to undergo brownfields redevelopment on the sites of the former manufacturing facilities. A major transportation infrastructure has been in the planning stages to support this redevelopment. Specifically, New Jersey Department of Transportation (NJDOT, 2008) "Tremley Point Access Local Roadway Improvements", Project ID 9324A is anticipated to be funded as part of the FY 2009 Transportation Capital Program that will consist of a four-lane, 1.1 mile long roadway and bridge to connect Tremley Point with Exit 12 of the New Jersey Turnpike in Carteret. This project is specifically intended to address "the increase in truck traffic anticipated by the redevelopment of the Tremley Point brownfields into more than six million square feet of warehouse and distribution space" (NJDOT, 2008).

Potential future land uses of the LCP site may include power generation, petroleum terminals, warehousing and distribution, and transportation.

2.2 Demography

In the following sections, demographic information (including population, economic indicators, and labor information) is presented and discussed. Data are reported for areas in New Jersey within a one-mile radius of the site's boundaries. Much of the data reported are based on 2000 census data.

2.2.1 Population

Population distribution for cities and townships in the vicinity of the LCP site is summarized on Table 2-1. Included are population data for the Cities of Elizabeth, Linden, and Rahway (of Union County) and the City of Carteret (of Middlesex County). As shown, the City of Elizabeth is the most densely populated (9,865.5 persons per square mile) and also has the largest population (120,568 persons) of the jurisdictional areas evaluated.

Change in population from 1980 to 1988 is also shown in Table 2-1. Union County has experienced an increase in population of 5.8 percent for the period of 1990 to 2000. Elizabeth, Linden, and Rahway have significantly gained in population (9.5 percent, 7.2 percent, and 4.7 percent change in population, respectively). Middlesex County experienced a significant 11.6 percent gain in population over this time period. The population change for Carteret increased 8.9 percent during this time. These data indicate that, in general, the area in the region of the LCP site experienced a growing trend in population during the period of 1990 to 2000.

Only a slight increase in population was expected for Union County for the time period 2000 and 2006 (1.6 percent), while a more sizeable increase in population (4.9 percent) was anticipated for Middlesex County during the same time period.

In Table 2-2, population distribution by age group is presented. As shown, the highest percentage of the population for the jurisdictional areas evaluated is within the working age group of 18 to 64 years. The City of Linden has the greatest amount of residents aged 65 years to older (at 16.3 percent) while the City of Elizabeth has the smallest amount (at 10.0 percent). This is also reflected by median age reported with Linden having the highest median age (38.0 years) and Elizabeth having the lowest (32.6 years).

2.2.2 Economic Indicators

Per capita income for the jurisdictional areas evaluated is reported in Table 2-3. In 1999, per capita income for the cities of Elizabeth, Linden, and Rahway were substantially less than that for Union County, with the City of Elizabeth having the lowest ($15,114). Similarly, the 1987 to 1999 percent increase in income for the City of Elizabeth (42.5 percent) was lower than that for Linden (57.3 percent) or Rahway (60.3 percent). The City of Carteret had a lower per capita income than the rest of Middlesex County; however, the per capita income reported for Woodbridge Township ($25,087) was very close to the number reported for Middlesex County ($26,535). The 1987 to 1999 percentage increase in per capita income was significantly less for Carteret (47.7 percent) compared to Woodbridge Township (71.1 percent).

Household income data reported for 1999 and 2004 are shown in Table 2-4. Median household incomes were somewhat higher for Middlesex County ($60,987) compared to Union County ($55,247). The percent of persons living below the poverty level in the City of Elizabeth was a substantial portion of the population (17.8 percent) and was over twice the number for Union County (6.4 percent). A similar trend was reported for families living below the poverty level in 2000; the percentage reported for the City of Elizabeth was 15.6 percent versus 5.0 percent for the City of Linden.

2.2.3 Labor Information

Available data on the civilian labor force for cities and counties in the vicinity of the LCP site are shown in Table 2-5. In 1999, the City of Carteret had the largest percentage of unemployed (at 5.8 percent) followed by the City of Elizabeth (5.2 percent), the City of Rahway (4.3 percent), and the City of Linden (3.6 percent). Union and Middlesex Counties displayed similar percentages of unemployed residents—3.5 percent and 3.4 percent, respectively.

Employment data by industrial category (1999 data) for Union and Middlesex counties is presented in Table 2-6. Employment trends are slightly different from what they were during the last census. The manufacturing industry accounted for the highest percentage of jobs in Middlesex County at 18.6 percent while the education and healthcare industries accounted for 18.4 percent in Union County. The retail trade industry is also a major employer in both counties. The agricultural and mining industry employs only a minor portion of the employed populations in Middlesex and Union counties (0.1 percent in both counties).

2.2.4 Summary of Demographic Characteristics

In summary, the New Jersey jurisdictional areas within a one-mile radius of the property boundaries are experiencing a slight increase in population. Only a small increase in population was projected in Union County to the year 2006 (1.6 percent increase) and a somewhat greater increase was projected for Middlesex County (4.9 percent). The majority of the population living in the region of the LCP site is of working age (18 to 64 years old). Of the jurisdiction areas evaluated, the City of Linden has the highest percentage of residents over the age of 65 years and also the highest median age (38.0 years).

Per capita income in 1999 for the cities of Elizabeth, Linden, and Carteret is substantially less than their respective counties. The lowest per capita income ($15,114) was reported for the City of Elizabeth. The percentage of persons and families living below the poverty level was also highest for the City of Elizabeth and represents a substantial portion of the population (17.8 and 15.6 percent, respectively). The percentages of persons and families living below the poverty level for the remaining jurisdictional areas were 11.0 percent or less and 8.6 percent or less, respectively.

The percentage of the total civilian labor force that was unemployed ranged from 3.4 percent (Middlesex County) to 5.8 percent (City of Carteret) in 1999. The majority of the work force in Middlesex and Union counties was employed in the manufacturing, education and the health care industry, and retail trade industries as of 1999.

2.3 Climate and Meteorology

Climatological data are recorded at the NOAA measuring station located at Newark Airport in Newark, New Jersey. The LCP site is located approximately seven miles south of the recording station. The elevation and topographic setting of the LCP site are very similar to that of the NOAA station such that the NOAA data provide an accurate representation of the climatology of the site. The climatology for the area was obtained from Comparative Climatic Data for the United States (NOAA, 2000) and monthly summaries up through 1998 (NOAA). Mean temperature and precipitation data contained therein are based upon a thirty-year period of record from 1961 to 1990 referred to as "normals". Wind direction and speeds are based upon records since 1944.

2.3.1 Temperature

Average daily temperatures range from a normal daily maximum of 87.0°F in July to a normal daily minimum of 23.4°F in January. The normal monthly temperatures range from 77.8°F to 30.6°F (Table 2-7) and occur in the months of July and January, respectively. The average 30-year normal of the average monthly temperatures for the period of record is 54.8°F. The average normal daily maximum is 63.4°F and the average normal daily minimum is 46.1°F. Although the average normal monthly temperature varies greatly, with an average deviation of 14.3°F, these temperatures occur in a relatively normal distribution (Figure 2-19), with July being the warmest month and January and February comprising the colder months on either side of the temperature distribution. Occurrences of extreme temperatures have been recorded as high as 105°F in July of 1966 and as low as 8°F in January of 1985.

2.3.2 Precipitation

The 30 year normal of the annual precipitation is recorded as 43.97 inches (Table 2-7). The annual precipitation is fairly uniformly distributed throughout the year (Figure 2-20) with a mean deviation of 0.30 inches. Extreme monthly precipitation values have been reported as high as 13.22 inches in October 2005 and as low as 0.07 inch in June 1949. The mean maximum precipitation for a 24-hour period is reported as 7.84 inches in August 1971. Relative humidity for the region averages 73 percent at sunrise (0700 hours) and 53 percent at sundown (1900 hours). Although slightly higher relative humidity readings are reported for the months of August through January, mean monthly readings occur in a generally uniform distribution throughout the year.

2.3.3 Prevailing Wind Direction and Speed

The prevailing wind direction for the area is from the southwest during the months of May through December as determined by data compiled by NOAA, since 1944. However, during the months of February through April, the prevailing wind direction is from the northwest or west-northwest. The mean wind direction in January is from the northeast.

The mean prevailing wind speed is reported as 10.2 miles per hour (mph), and varies from 11.9 mph in March to 8.7 mph is August (Table 2-7). Higher mean wind velocities occur during the months of November through May, while lower velocities are observed in the months of June through October. The highest wind speed (fastest observed one min value) recorded at the Newark Weather Station is 82 mph in November 1950. The next highest wind speed is recorded at 58 mph in December 1984.

2.4 Surface Water Bodies

In the following sections, information (including surface water features and classifications) is presented and discussed. Information is provided for both the region and for areas within the LCP site's boundaries.

2.4.1 Regional Surface Water Features

Tidal marsh formerly covered the entire area in which the LCP site is now located. Nearly all developed land in the Tremley Point area, inclusive of the LCP site, constitutes man-emplaced fill material laid over the former tidal marsh. Therefore, the topography of the area is relatively flat, with an elevation of only a few feet above sea level. The primary exception is the naturally-occurring high ground southwest of the LCP site along which Tremley Point Road runs. Additional information regarding the placement and distribution of anthropogenic fill is presented in Section 2.1.1.

The LCP site is almost entirely surrounded by tidal water bodies. Most prominent among these is the Arthur Kill, which is a large tidal straight that connects Newark Bay and Kill van Kull to the north and Raritan Bay to the south. The Rahway River, with a drainage area of 41 mi^2 (Rahway River Association, 2008) joins the Arthur Kill just south of the site. Piles Creek is a small tidal creek that connects to the Arthur Kill immediately north of the adjacent GAF site. To the west of the LCP site is the tidal stream known as Marshes Creek, which is a tributary of the Rahway River. Relatively extensive areas of unfilled tidal marsh exist along the lower reaches of the Rahway River, Marshes Creek, and Piles Creek.

Other tidal streams located further from the LCP site include Morses Creek and the Elizabeth River which flow into the Arthur Kill north of the site; and Kings Creek, which is another small tributary of the Rahway River, located west of the site. A number of tidal creeks enter the Arthur Kill from Staten Island including, from north to south, Old Place Creek, Pralls Creek, Sawmill Creek, Neck Creek and Fresh Kills. The locations of each of the surface water bodies are depicted on Figure 2-21.

2.4.2 Surface Water Classifications

The major surface water bodies located near the LCP site, including the Arthur Kill and the Rahway River, have been classified under the NJDEP Surface Water Quality Standards, N.J.A.C. 7:9B-1.15.

The Elizabeth reach Arthur Kill, along which the site is located, is classified as SE3. The designated uses of SE3 waters include: secondary contact recreation; maintenance and migration of fish populations; migration of diadromous fish; maintenance of wildlife; and any other reasonable uses [N.J.A.C 7:26B-1.12(f)].

The lower tidal reach of the Rahway River is classified as SE2. The intended uses of SE2 waters include maintenance, migration and propagation of the natural and established biota; migration of diadromous fish; maintenance of wildlife; secondary contact recreation; and any other reasonable uses [N.J.A.C 7:26B-1.12(e)].

2.4.3 Flood Hazard

Flood insurance studies for Union County, New Jersey (FEMA, 2006) reveal that various areas of the City of Linden are subject to both tidal (coastal) and fluvial (riverine) flooding. The tidal wave velocities are dampened by the meanders of the stream channels such that the tidal influence is less severe than the fluvial flooding along more inland local waterways. The City of Linden is subject to fluvial flooding along Morses Creek, Peach Orchard Brook, and Kings Creek which is caused by rivers and streams overflowing their banks. The Arthur Kill and its tributaries account for tidal flooding in the area. Water levels in these waterways are controlled by tidal conditions.

As stated previously, the site is nearly completely surrounded by tidal water bodies, including the Arthur Kill and its tributaries. The Arthur Kill (and its tributaries) are subject to tidal and coastal flooding influence and are not subject to riverine flood hazards. In addition, the facility is located outside of the influence of fluvial flooding by Morses Creek, Peach Orchard Brook, and Kings Creek. Therefore, the LCP site is not subject to riverine flooding.

Coastal flooding is caused by long and short wave surges that affect the shores of the open ocean, bays, and tidally influenced rivers, streams, and straights (such as the Arthur Kill). The movement of coastal waters is influenced by the astronomic tide and meteorological forces such as northeasters and hurricanes. Flooding is primarily the result of storm surges, wave setup, and wave run-up which occur during hurricanes and northeasters.

The 100-year tidal flood elevation has been established by FEMA (2006) at 8.4 feet NGVD, a level that would flood most of the LCP site.

2.4.4 Navigational Dredging

The Arthur Kill is a large, highly industrialized navigational tidal straight. It is tidally influenced by the New York Harbor and the Atlantic Ocean. Given the depositional character of the water body, it is necessary to periodically dredge the navigation channels to maintain this important waterway for commercial shipping. The dredging responsibility lies with the United States Army Corps of Engineers (USACE).

Dredging in the Arthur Kill has been performed since the 1870s when the navigational channel was first dredged to the depth of 16 feet (New York Times, 1873). In the recent decades, the navigation channel has been maintained at the depth of 35 feet and a width of 600 feet. A massive harbor improvement project is currently underway in which the navigational channels in the Arthur Kill will be deepened by dredging to a depth of 41 feet. The longer term plan will be to further deepen the Arthur Kill navigational channel to 50 feet (Port Authority of New York and New Jersey, 2008). The ongoing and planned future dredging necessarily results in the removal of huge amounts of sediment.

2.5 LCP Structures

2.5.1 Buildings

The chlorine production facilities that comprise the majority of the site were first constructed between 1954 and 1956. Cell Building No. 240 and other structures were not constructed until LCP ownership in the early 1970s. A brief description of the usage and history of the structures involved in the chlorine production, as well as the hypochlorite and hydrogen production facilities still found on the site follows below (Figure 1-3).

Building 223 – Kuehne Chemical Inc., Hypochlorite Facility – This facility was leased in 1972 and produced sodium hypochlorite (Bleach) from chlorine and sodium hydroxide transferred to the structure from the Chlorine facilities via overhead pipes. Chlorine, sodium hydroxide, hydrochloric acid and sodium hypochlorite were also stored and distributed from this facility.

Buildings 230 and 240 - Building 230 was the original mercury cell room that was built with the rest of the plant in the mid 1950s and contained 42 mercury cells. Building 240, the "new" cell room, was constructed sometime around 1972 and it contained 40 mercury cells. Process wastewater, brine spills, and mercury cell wash water in the buildings drained to concrete floor trenches, collected in sumps in the northeast corner of each cell building, pumped to holding tanks, and eventually pumped to a wastewater treatment system. Mercury was reportedly recovered from separators in the sumps and returned to the cells. A new concrete floor was poured over the old one in January 1981 due to the observation of cracks in the old floor.

Building 230 is among the most dilapidated structures at the site. Portions of the concrete block walls and individual concrete roof panels have periodically collapsed. However, this steel-framed building has not shown evidence of catastrophic failure and associated collapse. While the condition of Building 240 appears to be relatively un-degraded, the condition of the members that support a large gantry crane is not known.

Building 231, Liquefaction Building, Purasiv Area – Building 231 originally housed compressors and other equipment for chlorine liquefaction. An HCl burner and a commercial hydrogen gas purification unit ("Purasiv") used for the removal of mercury were located south of the building. A former electric substation, diesel generator, and wastewater area were located immediately north of the building.

Building 233 – Brine Building – Brine was treated and filtered in the brine treatment tank within Building 233. This included adding sodium hydroxide, sodium carbonate, and barium chloride to precipitate impurities out of solution. The remaining precipitates were transferred to the Brine Sludge Lagoon. Prior to the construction of the Brine Sludge Lagoon in the 1960's, it is unknown where the sludge was disposed of. The concrete block walls of this steel-frame building are substantially degraded.

Building 250 - Warehouse – The mortar between the concrete block in the walls appears to be substantially degraded. Portions of the warehouse may be in jeopardy of collapsing. However, the warehouse is a relatively small structure and no hazardous materials are known to presently exist within it.

Linde Hydrogen Plant - This structure was leased from the Owners of the site and operated from 1957 1990. Hydrogen produced from the chlorine process in Buildings 230 and 240 was piped to this facility where it was purified and stripped of mercury. Prior to the occupation by a new tenant, the lessee UCC had the building and equipment decontaminated and sampled for mercury. In 1990 the expiration of the lease prompted an ECRA investigation. An environmental investigation and cleanup followed, with NJDEP approving "No Further Action" (NFA) in 1995. The property was later used by Liquid Carbonic Corporation for office space and truck parking.

Salt Unloading - Salt to be used in the preparation of brine for the chlorine process was unloaded at this location.

Former Brine Sludge Lagoon (now referred to as the "Closed RCRA Unit") - Precipitate sludge from Building 233 was mixed with brine to form slurry, which was pumped into this surface impoundment. The liquid component of the slurry was allowed to settle out then was pumped back to Building 233 to be purified and recycled. The lagoon was closed under a RCRA permit in 1984.

Chemfix Lagoon - The Chemfix Lagoon was constructed in 1976 north of the Brine Sludge Lagoon to conduct a test to determine whether the mercury in the brine sludge could be stabilized, thereby allowing the material to be managed as non-hazardous waste. The lagoon had the rough shape of a triangle with sides of about 60 ft by 80 ft by 80 ft. and was constructed with 8 foot high earthen berms. It was lined with two layers of 0.20 mil thick impermeable geosynthetic liners separated by a sand layer for an underdrain leachate collection system. Leachate collected by the system was pumped to the wastewater treatment system at Building 231. A demonstration run was conducted by Chemfix Technologies Inc. in 1976. Approximately 120,000 gallons of brine sludge (about 460 cubic yards) were treated and stored in the Chemfix lagoon over a four-day period. The process was never repeated and the lagoon was not used again.

In October 1981, LCP Chemicals, Inc., submitted a closure plan for the Chemfix lagoon to the NJDEP and reported that the treated material had the consistency of concrete. The closure strategy consisted of dewatering the lagoon, treating the wastewater in their waste treatment facility, and transferring the solid Chemfix contents, including liners and leachate collection system, to the Brine Sludge Lagoon.

The closure plan was approved by the NJDEP and the Chemfix lagoon materials were transferred to the brine sludge lagoon by September 1983. The Chemfix lagoon was backfilled, graded, seeded, and formally closed by the end of 1983 with NJDEP approval.

Former Sludge Roaster - A pilot sludge roaster unit was constructed south of the brine sludge lagoon in 1978, but the brine sludge material was processed through it only infrequently. By 1980, the final modifications to the sludge roaster were completed and the unit was brought back on line after LCP Chemicals, Inc., was issued a temporary air permit from the NJDEP. In 1985, the unit was dismantled and moved off Site, leaving only the concrete pad.

A number of additional structures are located on the LCP site, including:

- Building 220 – Shops and Service Building
- Building 221 – Lab and Locker Building
- Building 234 – Cooling Tower
- Building 250 – Warehouse
- Building 309 – Cooling Tower
- FRP Fabricating Shop

2.5.2 Tanks

A number of tanks are located on the site that were previously used to store mercury, chlorine, hydrochloric acid, brine, bleach, petroleum and other compounds. The onsite tanks were investigated as part of the Phase I and Phase II RI. The name, location, contents and condition of the tanks are detailed in Table 2-8.

2.6 LCP Waste Handling

2.6.1 Wastewater and Site Drainage

Industrial process water and stormwater flow from the LCP site during operations drained to the Arthur Kill. This drainage occurred historically via the former GAF site drainage system through hydraulic connections to South Branch Creek. After approximately 1976, the wastewater drainage was treated separately from the GAF site. The drainage in and around the LCP site was modified several times, and is described as follows:

Prior to 1947

Prior to 1947, before operations began at the LCP site, South Branch Creek was oriented in what was a relatively natural tidal stream channel that was relatively unimpacted by filling (Figures 2-2 through 2-4). The flow originated from the area located west and south of the GAF site production area and flowed eastward across the center of what would later become the LCP site to discharge to the Arthur Kill (Figure 2-22).

Surface water drainage in the wetlands located to the southwest of the LCP Site flowed into the Northern Off-Site Ditch, and followed a parallel alignment to the future LCP property line towards the southeast and onward to a series of mosquito ditches leading to the Arthur Kill. The remnants of ditches from the western side of the LCP Site and adjacent GAF property directed drainage into the Northern Off-Site Ditch. The Southern Off-Site Ditch runs parallel to the Northern Off-Site Ditch and collected drainage from the future Conoco bulk petroleum storage property, and discharges to the same series of Mosquito Ditches.

1947 to 1951

Starting in 1947, South Branch Creek was diverted to an alignment that looped around the southern area of the future LCP production area prior to discharging to the Arthur Kill. The realignment was associated with the filling of the portion of the creek in what would become the production area of the LCP site. That same year the original creek was filled in. A primary treatment facility was constructed along the southerly loop of South Branch Creek on the LCP site as observed on the April 20, 1951 aerial photo (Figure 2-11).

The Northern Off-Site Ditch has been redirected to a culvert on the downstream end which appears to have directed flows in a northeast direction across the present day alignment of South Branch Creek. The alignment of the Southern Off-Site Ditch remains the same. The Southern Off-Site Ditch was placed in a culvert at its downstream end to re-direct flows in a direct eastward direction towards the Arthur Kill.

1951 to 1966

The construction of the future LCP site began in approximately 1951. The chlorine operation began at the LCP site in 1955. By 1956, the core of the buildings required for the chlorine productions were present, including Buildings 220 and 230. The hydrogen processing facility started operation in 1959. The Brine Sludge Lagoon was reportedly constructed in 1962. Four years later, berms were present along the north and west side of the lagoon area.

The South Branch Creek channel continued to flow to the Arthur Kill from the southeastern portion of the GAF site, as described above, around the southern end of the LCP site, until 1966 (Figure 2-23). During this time, wastewater in South Branch Creek and site drainage from the LCP and GAF sites were treated in the primary wastewater plant area located at the southern end of the South Branch Creek loop on the LCP site as observed on Figures 2-13, 2-14, 2-15 and Figure 2-22.

The process wastewater from the mercury cell buildings drained to concrete floor trenches where it was collected in the northwest corner of each building. The process wastewater was reported to have been pumped to holding tanks and eventually pumped to the on-site wastewater treatment plant.

1966 to 1971

South Branch Creek was relocated by 1966 into a covered channel (or "flume") located along the northern border of the LCP site (Figure 2-24). The primary WWTP located along the southern loop of South Branch Creek was apparently replaced at this time with a treatment area on the GAF site located several hundred feet upstream of the covered channel. The portion of South Branch Creek that previously looped around the southern side of the LCP site was replaced by a continuous concrete drainage trench.

1971 to 2003

In 1971, GAF ceased chlorine manufacturing operations. A year later, in 1972, LCP Chemicals, Inc. purchased the site from GAF and restarted manufacturing operations. Around the same time, the South Branch Creek channel located east of the railroad tracks was relocated into a newly created, narrow, man-made channel that discharged to the Arthur Kill approximately 950 feet south of the former South Branch Creek channel (Figure 2-25). This is the present alignment of the South Branch Creek channel.

A shallow concrete trench surrounding the process area was constructed in the 1970s (Eder, 1992) and was utilized to collect storm water and excess runoff from LCP Buildings 230 and 240. The flows in the trench were routed to a concrete sump south of Building 231 before being pumped to holding tanks outside Building 233. The water was pH adjusted, filtered, polished with carbon, and stored pending discharge to South Branch Creek under a NJPDES permit.

Wastewater treatment was previously reported to have occurred in a pond located along South Branch Creek immediately east of the electrical switchyard on the LCP site (Eder, January 1992) and as noted in an aerial photography analysis by USEPA (1999). Through the review of additional historic information, it is now known that this area was not used for treatment. This area is now known to have represented a wide segment of the ditch that was crossed by a bridge, hereinafter referred as the "Ditch Bridge Area" (Figure 2-14). The treatment area has been correctly located as previously discussed. The Ditch Bridge Area was reportedly excavated, backfilled, and covered with asphalt. The Ditch Bridge Area was still present in mid 1972 (LCP, July 21, 1972) and possibly only backfilled in 1982 (NJDEP, February 1982).

Around 1975-76, GAF constructed a new wastewater treatment facility on the GAF site. With the commencement of that wastewater treatment plant, wastewater flows from the LCP and GAF sites became separate.

The exposed portion of South Branch Creek, located immediately west of the railroad bridge, was blocked off with timber cribbing. This blockage of the creek likely occurred sometime after 1976 when the LCP site drainage was separated from that of the GAF site.

The chlor-alkali operations ceased in 1985. As discussed previously, the site continued to be used as a transfer terminal for other Hanlin products until 1994.

After 2003

Stormwater drainage from a large portion of the LCP site previously drained overland to a ditch that was located on the GAF site located immediately north of the LCP property line. Remedial construction activities at the GAF site including the construction of the shallow groundwater barrier and the site regrading have created a large undrained area in the northern and central areas of the LCP site.

Stormwater drainage from the LCP site is currently poorly defined. Large areas of the site are currently undrained including the aforementioned area along the GAF property line. In addition, much of the former LCP production area is currently undrained given the cessation of stormwater collection and treatment on the LCP site. Remaining areas of the site do drain to South Branch Creek and the unnamed ditch located immediately south of the LCP site. However, drainage from these areas is not well established given a lack of drainage structures and the nearly flat grades on the site. Accordingly, surface water that does drain to South Branch Creek and the unnamed ditch is characterized by undefined pathways and a distinct lack of high velocity flow. Ponding occurs in several areas of the site for long durations depending on rainfall intensity and duration.

2.6.2 Solid and Hazardous Waste Generation

It was reported that mercury-contaminated sludge, mercury vapors, spent lubricating oils, transformer oils, degreasing solvents, mercury contaminated process wastewater, spill wash down fluids and stormwater runoff were all waste products generated onsite (Eder, January, 1992).

The main source of mercury waste was the brine purification mud (otherwise known as, brine sludge) and associated process wastewater. In 1981, brine purification mud from mercury cell processes was listed as a hazardous waste by the EPA, No. K071. Associated wastewater treatment sludge was also listed as a hazardous waste, No. K106. The driving chemical behind the new classification was mercury.

A "typical" brine sludge composition as reported by LCP in 1975, was NaCl (20%), BaSO4 (50%), CaCO3 (15%), CaSO4 (15%), metal hydroxides (2%), dirt (2%), mercury (100-500 parts per million – 0.05%). Wastewater treatment sludge was also generated during chlorine production. In a 1975 LCP Preliminary Report on Brine Sludge, LCP estimated that 7.5 tons of sludge was generated everyday and that their current sludge stockpile was an estimated 11,000 cubic yards (Eder, 1992). Eder (1992) reported that up to 20 tons of sludge was generated per day.

Between 1980 and 1981, seven sludge samples were analyzed for selected inorganics (NJDEP, January 8, 1988). The samples showed that the sludge contained mercury concentrations ranging from 272 mg/kg to 4,574 mg/kg. Liquids filtered from the sludge contained mercury concentrations ranging from 40 µg/L to 2,520 µg/L.

A survey plan in a groundwater quality monitoring report by Geraghty & Miller (1982) shows that the brine sludge pile grew to a height of about 40 feet above the ground surface. An estimated 31,000 cubic yards of brine sludge was left in the lagoon at the time of its closure. The contents of the lagoon were dewatered, graded compacted and capped with clay and soil in 1984. This closure was permitted by NJDEP a New Jersey Pollution Discharge Elimination System (NJPDES) Discharge to Groundwater (DGW) Permit. The DGW permit is the New Jersey equivalent of a RCRA permit under USEPA's authorization of New Jersey's Hazardous Waste program.

Other potential sources of contamination included:

- Anthropogenic fill placement by duPont, GAF and Conrail.
- Kuehne Chemical Company, which operated at the site from 1972 to 1981, allegedly dumped bleaches and other caustic materials into South Branch Creek on a daily basis.
- The Linde Division Hydrogen Plant, which received mercury-contaminated hydrogen gas from about 1957 to 1980, processed mercury on a daily basis.
- Eder (September 1993) reported that small quantities of solvents used at the site for general cleaning and degreasing could have been released.
- Transformers were located behind Buildings 230, 240, and 231. (PCB contamination in the oil.)
- Storage tanks at the site used to store a number of different chemicals, including chlorine, sodium hypochlorite, sodium hydroxide, and methylene chloride (NJDEP, January 8, 1988).

- A 300 square-foot concrete drum storage pad with containment berms was located onsite. It was used to store motor oil, waste oil and other lubricants (Eder, 1993). During a NJDEP site inspection in December 1987, it was noted that there was stained soil in the area and vapors were detected.
- Active Water Jet discharged wash water from dirty tanks and pipes onto the site.

2.6.3 Environmental Compliance

2.6.3.1 Summary of Incidents and Enforcement Actions

In September of 1975, LCP was fined $10,000 for discharges of supernatant from the brine sludge lagoon into South Branch Creek in both 1971 and 1974, according to the NJDEP (July, 1991). On September 17, 1981 the NJDEP signed the Administrative Consent Order, which required LCP Chemicals, Inc. to cease use of the brine sludge lagoon by January 1, 1982, submit a closure plan for the sludge lagoon, submit a closure plan for the Chemfix lagoon, conduct air monitoring of the sludge pile and conduct groundwater, surface water, soil and sediment sampling sessions.

By late 1984 both sludge lagoons were closed. Air monitoring of the sludge pile took place on June 4, 1981 (RECON, 1981). Limited groundwater, surface water, soil, and sediment sampling were taken by Geraghty and Miller (1982).

The NJDEP issued an Order dated May 4, 1982 to cease the November 5, 1981 violation of N.J.A.C. 27-8.3(e)2 resulting from a ruptured muffler plate on the sludge roaster, which subsequently allowed mercury emissions to vent through for unpermitted roasting sessions. The sludge roaster was abandoned due to "bugs" in 1981. In a June 4, 1982 letter the NJDEP denied LCP's Hazardous Waste Facility Permit Application due to several deficiencies in the sludge roasting system. LCP responded with a letter promising to fix the issues with the brine stabilization process.

The EPA issued a Complaint/Compliance Order dated August 1982 for lack of freeboard in a surface impoundment (otherwise known as the brine sludge lagoon). LCP was also cited for lack of waste analysis plan, not maintaining a scheduled inspection period, and a lack of a contingency plan. The freeboard penalty held a $1,000 fine; however, the other violations were corrected, thus a fine was avoided.

One year later in 1983 the NJDEP issued two "Notice of Violations". One was for failure to submit a RCRA Treatment, Storage, or Disposal Facility Report. A report was submitted shortly after and so a penalty was avoided. The second was for failure to establish financial assurance for closure and post-closure monitoring of the brine sludge lagoon and to demonstrate financial responsibility for claims. LCP stated that the NJDEP Division of Waste Management now had copies of the necessary documents and that the matter was resolved.

The NJDEP issued an Administrative Order, dated February 11, 1985, requiring that LCP maintain documentation of the job title for each position at the facility related to hazardous management, the name of the employee that filled each job, security of roll-off containers with hazardous waste and to develop an evacuation procedure for employees. LCP corrected the problems and was issued a $900 fine.

2.6.3.2 Summary of Spills and Releases

The following spills/releases are documented by the EPA and NJDEP.

- In October 1972 and February 7, 1974, the NJDEP reportedly observed lagoon overflows into South Branch Creek, quantities and responses unknown. As for LCP, they acknowledged both discharges in September 1975 and were levied a fine by NJDEP of $5,000 for each occurrence (NJDEP, July 1991).

- June 25, 1975 – During a recycle pump failure, nine hours worth of discharge from the brine sludge lagoon spilled into South Branch Creek (LCP, July 27, 1975).
- August 15, 1979 – A salt blockage in a saturator caused an overflow of mercury contaminated brine (LCP, August 20, 1979). A sample of the overflow was taken by LCP and showed a concentration of 8.6 parts per million of TDS.
- In early 1981, a former employee who worked there from '72 to '80 stated he would sometimes analyze effluent water being discharged into South Branch Creek (NJDEP, October 7, 1981). It was noted that one specific time this former employee measured mercury concentrations of eight to ten times greater than the maximum allowances.
- October 7, 1981 – The NJDEP cited the Kuehne Chemical Company for discharging caustic material into the creek (NJDEP, October 7, 1981). Kuehne refused to accept charges and subpoenaed the NJDEP twenty days later for depositions. The outcome is unknown.
- The following spill documentation was noted in a RCRA Facility Assessment for LCP, NJDEP Site Inspection Reports regarding several spills near the 500,000 gallon brine tank (NJDEP January 8, 1988):
  - The first of the documented spills was in September 1980 when an unspecified amount of brine sludge was noted on the gravel near the tank. The second was also in 1980, one month later. While transferring brine sludge from the 500,000 gallon tank to the lagoon some was spilled. (Front end loader and dump trucks were used for this process). LCP stated that the sludge would be flushed to the sump next to the tank.
  - In January 1981, an overhead pipe appeared to have a leak, which dumped wash water from cells onto unpaved ground. Another pipe was observed to have had a leak in 1981. However, this pipe was filled with hydrochloric acid. The final spill located by the 500,000 gallon tank was noted in April 1982. It involved a spill of sodium sulfide crystals.
- Though that was the final spill documented by the tank, it was not the last documented spill on site. Other NJDEP Site Inspection reports cite brine sludge spills/ leaks (NJDEP, January 8, 1988). Three examples were found and are listed below, all in 1981.
  - In January 1981, a former employee who worked on site from 1972 to 1980 stated that brine sludge was removed from the lagoon and spread out on the ground between Building 231 and the railroad tracks (NJDEP January 25, 1981). It was noted that to the former employee's knowledge this only happened one time in either 1973 or 1974.
  - In October 1981, a 1 ft by 15 ft spill of brine sludge slurry leaked from overhead piping between the 500,000 gallon tank and the sludge lagoon. The exact location is not well documented, but noted on the NJDEP sketch maps (NJDEP November 19, 1981).
  - In November of 1981, an overhead line was leaking, resulting in a 30 ft by 125 ft spill along Avenue B railroad tracks.

The information on spills/releases at the LCP site was one factor used to develop the original RI work plan for the site (URS, 2001).

2.6.3.3 LCP Environmental Upgrades

LCP met with the NJDEP by 1975 to investigate waste disposal options for brine sludge, wastewater and the estimated 11,000 cubic yards of sludge material stockpiled in the brine sludge lagoon. LCP Chemicals, Inc. informed the NJDEP that off-site disposal options were too expensive and elected to begin pilot testing a more cost effective stabilization process developed by Chemfix Technologies, Inc.

As required for stabilization, an auxiliary surface impoundment was constructed onsite, the Chemfix lagoon. Its process treated about 120,000 gallons (or 460 cubic yards) of brine sludge over its 4 days existence in 1976. The results were apparently questionable, so the Chemfix process was never continued.

LCP Chemicals, Inc. also tested a sludge roasting process. This stabilization method would volatilize and capture mercury from steam dried brine sludge. LCP received favorable results during bench testing. A pilot sludge roaster unit was constructed south of the brine sludge lagoon in 1978. Throughout the lifespan of the sludge roaster, it was only used infrequently as it required constant "debugging, modification, and repair". Finally in 1980, the sludge roaster was up and running. LCP was issued a temporary air permit from the NJDEP, although a final permit was never issued. In December 1980, LCP Chemicals, Inc. and the NJDEP agreed that the brine sludge lagoon required closure and would formalize the process through an Administrative Consent Order.

In 1982, LCP ceased plant operations during the lagoon closure as a protective measure for plant workers' health and safety, reportedly at the orders of the NJDEP and EPA. A year later the Chemfix lagoon was closed (all materials were transferred to the brine sludge lagoon). The brine sludge lagoon was closed by November 1984 with NJDEP approval. In accordance with law, the lagoon was reportedly dewatered, compacted, covered with a two foot thick clay cap, and then covered again with soil and seeded as part of a RCRA permit for the Closed Brine Sludge Lagoon). This area is now called the closed RCRA Unit. In June 1984, LCP submitted a facility closure plan to the NJDEP. The EPA (1984) stated that LCP Chemicals, Inc. had planned to begin chlor-alkali manufacturing facility operations again in late 1984, but decided to cease all plant production instead. By August 1985, all plant productions were stopped. The facility was dismantled; the equipment was shipped to other LCP facilities along the east coast. The facility was still being used as a storage and transfer station for chlorine-related products, including, sodium hydroxide, potassium hydroxide, methylene chloride, and hydrochloric acid.

The Hanlin Group, Inc. filed for bankruptcy under the Chapter 11 of the U.S. bankruptcy code in July 1991. By April 1994, Hanlin sold all of its company assets and ceased all operations. After a site visit in August 1994, the EPA confirmed that the facility was no longer functional and that all employees were expected off the site by the end of August 1994. On November 10, 1998 the site property was formally abandoned by the bankruptcy trustee by order of the Federal Bankruptcy Court.

2.6.3.4 Environmental Permits

In 1975, a NJPDES - Discharge to Surface Water (DSW) permit was granted to LCP for discharge of treated wastewater.

In August 1974, Kuehne Chemical Company submitted a New Jersey Pollutant Discharge Elimination System (NJPDES) permit application (No. 0027707). It was not until August 1980 that Kuehne received a permit for discharge of cooling water only. One year later, the NJDEP alleged that Kuehne was illegally dumping caustic chemicals. A Notice of Civil Administrative Penalty Assessment was issued to Kuehne. The notice states that a pipe was observed during an NJDEP site visit on January 26, 1981 "connected to the outfall in such a manner as to allow for a physical conduit for the passage of pollutants to the waters of the State." The connection was removed the next day on a follow-up visit by the NJDEP. The notice also stated that the Kuehne operations had ceased and vacated the site on the next day.

A NJPDES-DGW permit (No. NJ0077038) renewal was issued to LCP Chemicals – New Jersey on June 11, 1993 with respect to the RCRA closure of the former brine sludge lagoon. This permit is the equivalent of a RCRA Post Closure permit under the USEPA authorization of New Jersey's Hazardous Waste program.

2.6.3.5 Interim Remedial Actions

Interim Remedial Measure of Former Mercury Cell Buildings

An Interim Removal Action (IRA) was performed by ISP-ESI in the former mercury cell buildings and elsewhere in the production areas on site in 2001 and 2002. The IRA included the removal and disposal of former process equipment, laboratory samples and chemicals, visible elemental mercury that was present at that time, loose asbestos, and miscellaneous debris. Further detail of the IRA is provided in the Interim Removal Action Final Report, prepared by URS dated April 16, 2001.

Proposed Interim Action for South Branch Creek

The conceptual design for an Interim Action (IA) was proposed by ISP-ESI on June 15, 2007, in response to the presence of elevated mercury and other contaminants in sediment and low marsh soils associated with South Branch Creek. The IA was intended to arrest the potential migration of the contaminated low marsh soils and sediments from the site. Implementation of the proposed IA was rejected in a letter from Ms. Carole Petersen of USEPA dated August 8, 2007.

2.7 Regional Geologic Conditions

The area of the site is located on the eastern edge of the Newark Basin, which is located in the Triassic lowlands subprovince of the Piedmont Plateau physiographic province of New Jersey. The Newark Basin contains approximately 15,000 to 20,000 feet of late Triassic and Early Jurassic (135 to 225 million years ago) continental derived sediments, including shales, siltstones, sandstones, and conglomerates. Interbedded among these sediments are three major extrusive basalt flows and one major diabase intrusive, representing volcanic episodes during the early Jurassic period (Olsen, 1980). A thin mantle of Pleistocene glacial and Recent deposits covers much of the Newark Basin rocks today. These units are described in additional detail in the following subsections.

2.7.1 Surficial Geology

Anthropogenic Fill

Anthropogenic filling of the region began in the 1600s as soon as European settlement occurred. Larger scale filling occurred in the late nineteenth and early twentieth century and was largely associated with industrial and transportation infrastructure development. Filling continued in the area to support the Newark Airport and the Port Newark and Port Elizabeth marine terminals until around 1970. A large percentage of the former tidal marshes in the area have now been filled. The emplaced fill materials include sand, gravel, silt, clay, and rock, as well as various man-made materials like cinders, ash, brick, concrete, wood, slag, glass, and trash (Stanford, 2002). The fill is most often less than 10 feet thick but may be thicker in road and rail beds.

Tidal Marsh Deposits

Recent sedimentation in the region includes alluvium (river), tidal marsh, and eolian (windblown) deposits. The alluvium includes floodplain, channel, and backswamp deposits, which include sands, silts and minor gravels and clays with sorting that varies from well to poor, depending on the specific depositional environment.

Tidal marsh material, underlying the anthropogenic fill, is present beneath much of lowland areas that comprise the eastern portion of Linden bordering the Arthur Kill and other coastal and tidal water bodies in New Jersey. Tidal marshes are flat, low lying coastal areas that become regularly inundated during high tide periods. Sediments that have formed in the marsh areas in the vicinity of the site include organic rich silts and clays, as well as peat. The peat typically consists of a horizontal layer of roots of salt tolerant plants in various stages of biological decomposition. The peat occurs in varying states of

weathering and consolidation. Peat typically weathers to organic silt and clay. Thus, it is not unusual to encounter the organic silt and clay beneath peat at the base of the tidal marsh deposits. Fine to coarse grained, well sorted sand sediment that formed as the result of eolian (e.g., wind-blown) deposition may be interbedded with the organic clay and peat (Stanford, 2002).

Glacial Till

The Linden area is situated near the glacial terminus and was covered with a relatively thin layer of glacial ice during the last (Wisconsin) ice advance. During this time, much of New Jersey to the west and northwest was covered with a thicker ice layer, estimated to have been at least one mile thick. As a result of a lighter overburden of ice, glacial deposits near the glacial terminus are considerably less dense and less compacted than those to the west and northwest. As the glacier melted, numerous glacial sediments (tills and moraines) were deposited over much of New Jersey. Ground moraine deposits are typically poorly sorted and not stratified. Much of the area north of the terminal moraine, including Linden, New Jersey, is covered by a sheet of ground moraine more commonly called till.

The Rahway Till found in and around the LCP site varies from silty sand to sandy clayey silt. The till contains some to many pebbles, cobbles and a few boulders. The till can be as thick as 90 feet but is usually less than 20 feet in thickness (Stanford, 2002).

2.7.2 Bedrock Geology

The unconsolidated deposits are underlain by Triassic-Jurassic aged sedimentary rock. The rocks formed following the close of the Paleozoic Era (225 million years ago), when compressive forces that formed the Appalachian Mountains relaxed, and extensional forces associated with the rifting and spreading of the Atlantic Ocean began. A series of isolated troughs called grabens formed east of the Appalachian Chain extending from Nova Scotia to North Carolina. As spreading of the ocean progressed, large blocks of crust down-faulted along extensional fault zones. Synchronous with the down faulting, large quantities of continental sediments produced from the erosion of the Appalachian Mountains were deposited in these troughs. The continued accumulation of sediments overloaded the troughs and contributed to their subsidence. This sinking effect allowed for the thick accumulation of Triassic sediments that exist in the Newark Basin. During the early Jurassic Period (180 million years ago), as rifting continued, faults in the area became progressively deeper and intersected the earth's mantle. Consequently, volcanism occurred in the form of extrusive basalt flows over parts of the basin, forming the Watchung Mountains of New Jersey. Three separate episodes of basalt flows occurred, interrupted by periods of continental sedimentation (Faust, 1975).

Nine formations comprising the Newark Supergroup resulted from the lithification of these basin sediments and volcanic flows (Olsen, 1980). The formations from oldest to youngest are as follows: the Stockton, the Lockatong, the Passaic, the Orange Mountain Basalt, the Feltsville, the Preakness Basalt, the Towaco, the Hook Mountain Basalt, and the Boonton. Contemporaneous with the basalt flow events, intrusive sills and feeder dikes formed the Palisades Diabase. The diabase unit is not classified as part of the Supergroup, despite its stratigraphic presence within the Newark Basin formations.

Three of the nine Newark Super group formations are present below the site, including the Stockton, the Lockatong, and the Passaic. The Stockton and the Lockatong formations were not encountered during the investigation, as they are present only at great depth; therefore, they will not be discussed further in this report. The Passaic formation was observed during the investigation and is discussed below in greater detail.

- **Passaic Formation (JTp):** According to Olsen (1980), the Passaic formation, representing flood bank and fluvial deposits, reaches a thickness of approximately 20,000 feet. This unit consists of reddish brown mudstone (a non fissile equivalent of shale), siltstone, and sandstone interbedded with conglomeratic sandstones along the basin margins.

- **Lockatong Formation (Tl):** The Lockatong Formation, which conformably underlies the Passaic Formation, is approximately 3,800 feet thick in west central New Jersey and thins laterally to the northeast and southwest. This formation was deposited as a large lacustrine lens composed of gray and black shales with argillite, flagstone and impure limestone layers (Wolff, 1977). Regionally, the lower members of the Lockatong Formation are intruded by the Palisades diabase as a sill.
- **Stockton Formation (Tl):** The Stockton formation consists primarily of lacustrine sediments similar to the overlying Lockatong formation. The lower Stockton represents mostly fluvial deposits. The Stockton Formation consists of sandstone, siltstone, arkose conglomerate and mudstone with color ranging from a light brown to dark brown-purple-red. The formation has a maximum thickness of 6,000 feet.

One of the nine Supergroup formations, the Passaic Formation (JTp), is present below the Site. In this area, the Passaic Formation is comprised of two facies: the sand and siltstone facies to the northwest and mudstone facies to the southeast of the area. The Linden area is underlain by the mudstone facies. Typically these sediments form cyclic sequences of cross-bedded units that grade upward from coarser to finer grain size. The dominant facies in the formation are siltstone (60%) and mudstone (40%) with the coarser sandstones and conglomerates comprising only a small fraction of the total percentage. Generally, the overall sequence of the Lower Passaic formation becomes finer from bottom to top with more mudstone and less siltstone going upward (Olsen, 1996). The Upper Passaic formation displays the reverse trend, with increasingly frequent silt and fine sand beds and less frequent gray and black mudstones progressively towards the top of the unit.

The upper shale (mudstone) of the Passaic formation is relatively soft and easily weathered. At surface exposures this rock is intensely and indiscriminately fractured on a small scale (1 to 5 mm) and obtains a hackly to chippy appearance. Unlike the siltstone layers of the Passaic formation, this rock lacks well-developed bedding planes and the regional joint pattern set (Houghton, 1986).

With increasing depth, the shale grades vertically into hard, massively bedded siltstones. The regional joint system is very prominent in these rocks and the bedding planes are very distinctive. The dominant strike of the Passaic Formation is reported to be N50°E with the beds dipping gently to the northwest between 9° and 12°. The shale also has a prominent set of vertical fractures (joints) striking N45°E and a less prominent second set of near vertical fractures striking N75°W. Regionally, this rock outcrops several miles west of the site where it exhibits more resistance to weathering and retains its characteristic features.

2.8 Regional Hydrogeologic Conditions

The Passaic and Lockatong Formations form the widespread Brunswick aquifer which conducts water in the region eastward to discharge to the Arthur Kill. Groundwater is found predominantly in the fracture planes within this rock and flow is directionally controlled by the fracture orientation. Permeability and storage are also controlled by fractures in the mudstone and siltstone facies though not necessarily to the same degree in the sandstone facies (Michalski, 1996). Hydraulic conductivities in the Brunswick Aquifer have been found to range from 6.9×10^{-7} cm/sec to 7.6×10^{-3} cm/sec (New Jersey Geological Survey, 2004; Michalski, *et al.*, 1992).

2.8.1 Groundwater Use

Due to the proximity of the Arthur Kill and other tidal waters to Linden, groundwater within this region, including the Passaic bedrock aquifer(s), is typically saline (Anderson, 1968). Since this water exceeds the New Jersey Safe Drinking Standards for naturally occurring salinity, the area is unsuitable for public water supply wells.

Regionally, brackish groundwater concentrations tend to diminish gradually with increasing distance from the source waters. Further inland from the Arthur Kill and within five miles of the site, the Passaic formation is extensively developed as the primary water supply source. The depths of these wells range from 75 to 570 feet and yield volumes of water between 100 and 400 gallons per minute (see Table 2-9). Locally occurring unconsolidated aquifers have also been tapped for water supply within this region. Relatively fewer in number, these aquifer(s) serve as the primary public water source for the Rahway area. Also, some shallow supply wells screened in the Quaternary sand and gravel, and yielding up to 300 gallons of water per minute, are used as a source of industrial waters.

Six (6) public community water supply wells (Figure 2-26), all upgradient of the site, are located within a four to five (4 to 5) mile radius of the site. As shown in Table 2-9, the depths of these wells typically range from 200 to 500 feet bgs. The pumping rates for these wells are not known but the capacity for wells range from 200 to 450 gallons per minute (gpm). Each of these wells is owned and operated by the New Jersey American Water and are located approximately four miles to the northwest and upgradient of the Arthur Kill. New Jersey American Water is the primary supplier of potable water to the Linden, New Jersey area. At the site, all potable water is provided by the New Jersey American Water.

2.8.2 Groundwater Classification

The "default" groundwater quality classification in New Jersey is Class II-A unless otherwise classified as Classes I, II-B or III. Per N.J.A.C. 7:9C-1.5(e)1, "The primary designated use for Class II-A ground water shall be potable water and conversion (through conventional water supply treatment, mixing or other similar technique) to potable water." Therefore, most groundwater in New Jersey is regulated for potential potable supply."

Notwithstanding the Class II-A classification, there are specific areas in the region and at the site in which groundwater is not suitable for potable uses. Some of these have been formally reclassified to Class III-B pursuant to N.J.A.C. 7:9C-1.5(f)4 in recognition of the naturally-occurring saline condition of the groundwater. Other areas that would not meet the Class III-B reclassification requirements nevertheless are unlikely to be developed for potable water supply given other regulatory constraints. These conditions are described as follows:

Overburden Water-Bearing Zone

While naturally-occurring saline conditions are observed in areas of the overburden water-bearing zone in very close proximity to tidal surface water bodies, the areal distribution of this condition is insufficient for the reclassification of the entire zone at the LCP site. However, at least two (2) separate New Jersey regulations would prevent the overburden water-bearing zone from ever being used at the site as a potable or non-potable water supply through the installation of Category 1 or 2 wells[3].

N.J.A.C. 7:9D (Well Construction and Maintenance; Sealing of Abandoned Wells) states that for potable water supplies installed in unconsolidated formations:

> "All well casing shall be no less than four inches in diameter and no less than 50 feet in depth" (N.J.A.C. 7:9D-2.3(a)3i.); and "All wells shall have a minimum length of 50 feet of grout seal extending from the top of the gravel pack or top of the well screen to grade." (N.J.A.C. 7:9D-2.3(a)3iii.)

[3] Per N.J.A.C. 7:9D-2.1, Category 1 Potable Water Supply Wells are defined as "domestic, non-public, public community supply, and public non-community wells" and Category 2 Non-Potable Water Supply Wells are defined as "fire protection, irrigation, test, industrial, livestock, open loop geothermal and injection or recharge wells."

By application of this regulatory restriction, a water supply well can never be installed within the overburden water-bearing zone at the site since it is required to be entirely sealed off by impermeable casing material. Geologic information presented in Section 5.1 reveals that the depth to the bedrock beneath the site typically ranges between 35 and 50 feet below ground surface. This depth is short of the minimum 50 foot casing and grout requirement specified in N.J.A.C. 7:9D such that it would be physically impossible to install a well in the overburden without violating the 50-foot casing requirement.

In addition to this well construction restriction, N.J.A.C. 7.7E (Coastal Zone Management) restricts groundwater use in areas where coastal resources could be negatively impacted by pumping. With regard to groundwater use, this particular regulation states:

> "Coastal development shall demonstrate, to the maximum extent practicable, that the anticipated groundwater withdrawal demand of the development, alone and in conjunction with other groundwater diversions proposed or existing in the region, will not cause salinity intrusions into the groundwaters of the zone, will not degrade groundwater quality, will not significantly lower the water table or piezometric surface, or significantly decrease the base flow of adjacent water sources." (N.J.A.C. 7.7E-8.6(b))

It is likely that groundwater withdrawals from the overburden water-bearing zone would cause substantial reduction of the water table surface that would potentially cause saltwater intrusion. Thus, approval for the use of overburden groundwater as a drinking water source would not be possible under N.J.A.C. 7.7E.

Nevertheless, despite the actual use or potential use of the resource, the regulatory standards for Class II-A are the applicable standards for the overburden water bearing zone

Bedrock Water-Bearing Zone

The bedrock water-bearing zone at the LCP Site has formally been reclassified as Class III-B as described in the document titled "Request for Class III-B Aquifer Designation, LCP Chemicals Inc. Superfund Site and ISP-ESI Linden Site, Linden, New Jersey" (Brown and Caldwell, April 2008) and as approved by a letter from Messrs. Frank Faranca and Ian R. Curtis of NJDEP dated February 27, 2009.

The groundwater quality within the bedrock water-bearing zone was characterized through the sampling of monitoring wells installed and located on both the LCP site and the adjacent GAF site. The water quality data include the results from chloride and total dissolved solids (TDS) analyses in addition to numerous other analytical parameters. Chloride and TDS are the two parameters specified in N.J.A.C. 7:9C as the parameters used to establish Class III-B classification. N.J.A.C. 7:9C states that:

> "Class III-B ground water consists of all geologic formations or units which contain ground water having natural concentrations or regional concentrations (through the action of salt-water intrusion) exceeding 3,000 mg/l Chloride or 5,000 mg/l Total Dissolved Solids, or where the natural quality of ground water is otherwise not suitable for conversion to potable uses."

The chloride and TDS results for the LCP and GAF sites exceeded the Class III-B criterion of 3,000 mg/L for chloride and the 5,000 mg/L criterion for TDS for all tested bedrock wells on the LCP site. These data demonstrated that the groundwater quality conditions in the bedrock water-bearing zone are impacted as a result of naturally-occurring, salt water intrusion from the nearby tidally influenced surface water bodies.

2.9 Ecologic Conditions

No endangered, threatened, or rare (ETR) species or significant ecological communities have been found within the LCP site's boundaries, nor are there any records at NJDEP of rare wildlife or plant species or ecological communities within the site (NJDEP has reported that foraging habitat for several threatened bird species lies within ¼ mile of the site [black- and yellow-crowned night herons and colonial water birds], but none of these species have actually been observed). Similarly, NYSDEC indicated that two endangered bird species are located within ¼ of the site (yellow-crowned night heron and pied-billed grebe). South Branch Creek represents low-grade habitat for these species and nesting on site is therefore not expected. There is also no suitable habitat in the site area for the two species listed for Union County on the Federal Comprehensive List of Endangered and Threatened species provided on the USFWS's website (one turtle, one bat).

Overall, the flora and fauna found on the site are species typically found in heavily industrialized areas within intertidal marsh ecosystems. Vegetative species found within the site are very common to highly disturbed areas and possess no Federal or New Jersey State protection. Six terrestrial mammals and two terrestrial reptile/amphibian species have been reported. No aquatic mammals have been reported.

South Branch Creek and the Arthur Kill are National Wetlands Inventory (NWI)-mapped wetlands. There are no State designated wetlands on site. A wetlands delineation was performed along South Branch Creek for which a Letter of Interpretation was obtained by NJDEP (Figure 5-18). The border of the nearest NJDEP-mapped wetland is located to the south of the site, approximately 500 feet from the outlet of South Branch Creek to the Arthur Kill.

Pralls Island, located in the Arthur Kill directly opposite to the LCP site off the shoreline of Staten Island, contains areas of New York State Department of Environmental Conservation-mapped Tidal Wetlands. Classified tidal wetlands include areas identified as Intertidal Marsh, High Marsh, and Formerly Connected. The locations of these wetlands are presented in Figure 2-27. Please refer to the Habitat Assessment report (Appendix F) for additional details.

2.10 Regional Studies

As stated previously, most of the region was highly industrial and consists of land that has been created through the filling of tidal wetlands. The Arthur Kill is a large navigable, tidal straight that is tidally influenced from the New York Harbor and the Atlantic Ocean. Likewise, the Rahway River to the south is a tidally influenced tributary of the Arthur Kill traveling through an industrial area. Background contaminant conditions and contributions to the sediments from many sources are widespread. There are numerous NJDEP-contaminated sites in the region, in addition to the LCP site, many of which have the highest remedial level designations of "C3" and "D," indicating high levels of multiple contaminants that may be impacting surface and groundwater. Additionally, there are a number of sites within the Newark Bay complex with extremely high mercury levels that may influence levels in Arthur Kill (NJDEP 2001). In addition, the New Jersey Turnpike, completed in 1954, crosses Piles Creek west of the GAF site. The Turnpike is a regional source of contaminants typical of road runoff, such as heavy metals (particularly lead), BOD/COD, nutrients, oil and grease, PAHs, pesticides, herbicides, and PCBs, as well as of contaminants released through spills and accidents on the roadways.

Numerous studies have addressed specific contaminants and their fate and transport in the New York/ New Jersey Harbor system. Many of these are catalogued and distributed by several regional organizations. Key data from these organization's databases are presented on Figures 2-28 through 2-30. Additional information regarding the regional studies is described below.

2.10.1 Contamination Assessment & Reduction Project (CARP)

Contamination Assessment & Reduction Project (CARP) is a coalition of harbor partners from federal, state and non-governmental branches, headed up by the New York State Department of Environmental Conservation (NYSDEC). The purpose of the project is to find solutions for the harbor's dredged materials. Its main objectives are identifying and quantifying the sources of contamination, establishing baseline levels of contaminants of concern in the water, sediment and fish tissue, and predicting future conditions (CARP, 2008).

CARP uses mathematical modeling to characterize the dioxins/ furans, PAHs, pesticides, and metals present in the harbor system. Their models include point and non-point source loading inputs, estuarine hydrodynamics and sediment transport, contaminant fate and transport, bioaccumulation and toxicity (CARP, 2008). The results used for these models are stored in a database. The database not only stores CARP data but also a range of other data sources, including the EPA's REMAP project.

The EPA's Regional Environmental Monitoring and Assessment Program, otherwise known as REMAP, is a regional study, which obtains information on the New York/ New Jersey Harbor. It was created to "answer ecological questions on a regional scale" (EPA, 2007). The project obtains sediment, water and benthic samples. These results can be found in the CARP database along with several other projects.

In Figures 2-28 and 2-29 CARP's results for mercury and dioxin in the estuary sediment have been plotted. Each figure shows a large number of samples collected in the Lower Passaic region due to its industrial nature, which is a useful comparison for the LCP region.

2.10.2 National Oceanic and Atmospheric Administration (NOAA)

National Status and Trends Program run by the National Oceanic and Atmospheric Administration (NOAA) also monitors the Hudson-Raritan Estuary. The concentrations of contaminants and the biological responses to said contaminants in this area have been compared to other sites around the United States. This study specifically targets point and non-point sources and characterizes the contaminants of concern for each.

The NOAA study was used to determine the current status of the NY/NJ Harbor estuary system. Their samples were taken north of the LCP site, mostly in the Newark Bay and in the lower Passaic River, Figure 2-28 through 2-30. These results were then compared with the CARP data and the LCP data.

2.10.3 Old Place Creek

Old Place Creek was selected to serve as a reference stream. Old Place Creek is a tidal creek consisting of salt marshes and an adjacent successional southern hardwood forest, and is located in Staten Island, New York, on the eastern side of the Arthur Kill (Figure 2-21). The area is located immediately north of the Goethals's Bridge and is surrounded by heavy industrial development. This creek is similar in many respects to SBC, including the width and depth, and provides a tool for evaluation of SBC and other regional data.

Samples of sediment, surface water, and biota were collected in Old Place Creek by BC on behalf of ISP-ESI contemporaneously with the Phase II RI in fall 2008. The purpose of this effort was to characterize regional background conditions. Samples were analyzed for TCL/TAL analytes as well as total and methyl mercury, and Dioxins/Furans. The results of the study of Old Place Creek are presented in Appendix M.

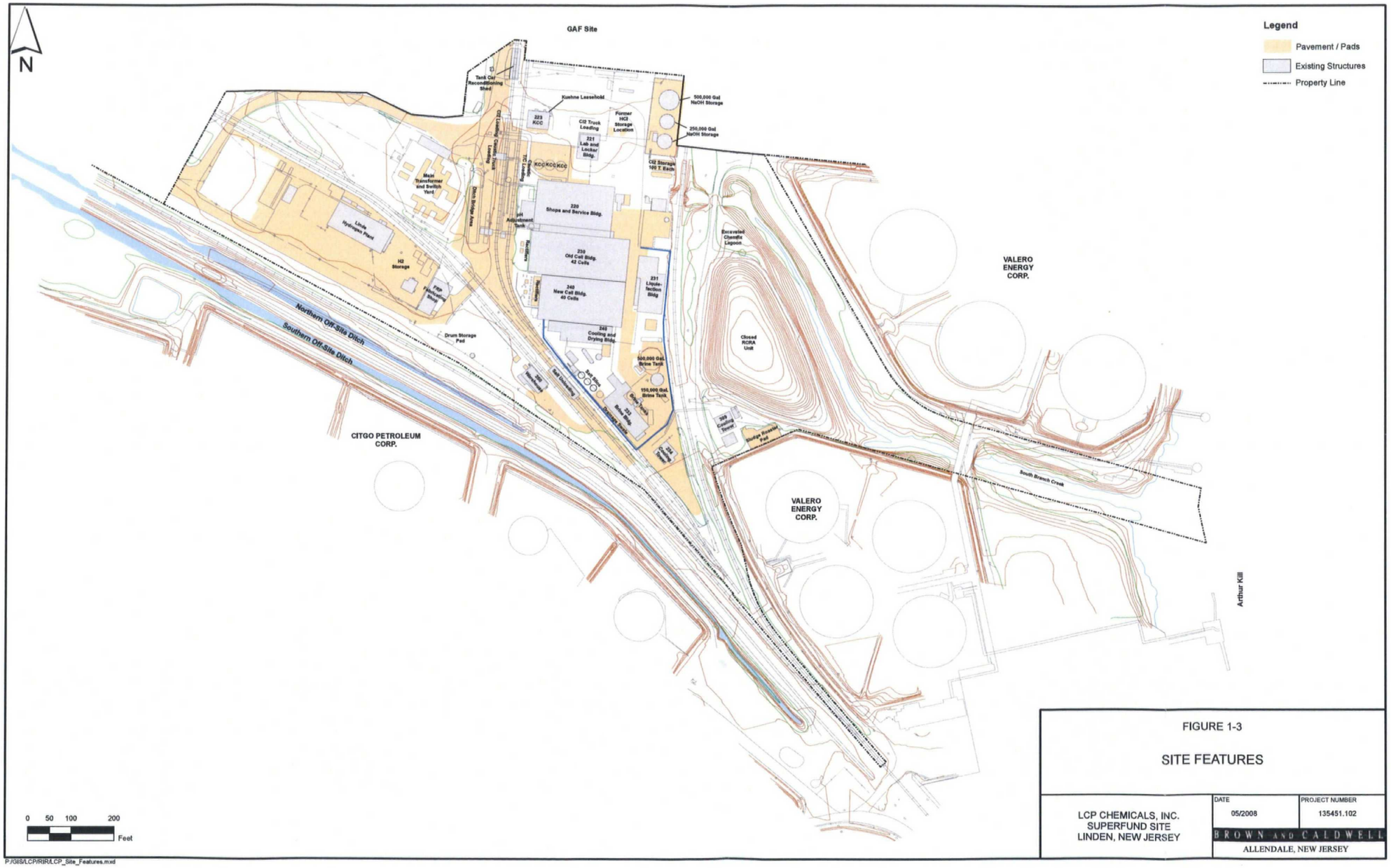


FIGURE 1-3

SITE FEATURES

LCP CHEMICALS, INC. SUPERFUND SITE LINDEN, NEW JERSEY	DATE 05/2008	PROJECT NUMBER 135451.102
	BROWN AND CALDWELL ALLENDALE, NEW JERSEY	

R2-0003432

P:\GIS\LCP\RIR\LCP_Hg_Soil_Fill_0-2ft.mxd

FIGURE 6-1a

TOTAL MERCURY IN SOIL
FILL MATERIAL 0 - 2 FT DEPTH

LCP CHEMICALS, INC. SUPERFUND SITE LINDEN, NEW JERSEY	DATE 07/2008	PROJECT NUMBER 135451.106
	BROWN AND CALDWELL ALLENDALE, NEW JERSEY	

R2-0003493

P:/GIS/LCP/RIR/LCP_Hg_Soil_Fill_gt2ft.mxd

FIGURE 6-1b

TOTAL MERCURY IN SOIL
FILL MATERIAL >2 FT DEPTH

LCP CHEMICALS, INC. SUPERFUND SITE LINDEN, NEW JERSEY	DATE 07/2008	PROJECT NUMBER 135451.106
	BROWN AND CALDWELL ALLENDALE, NEW JERSEY	

R2-0003494

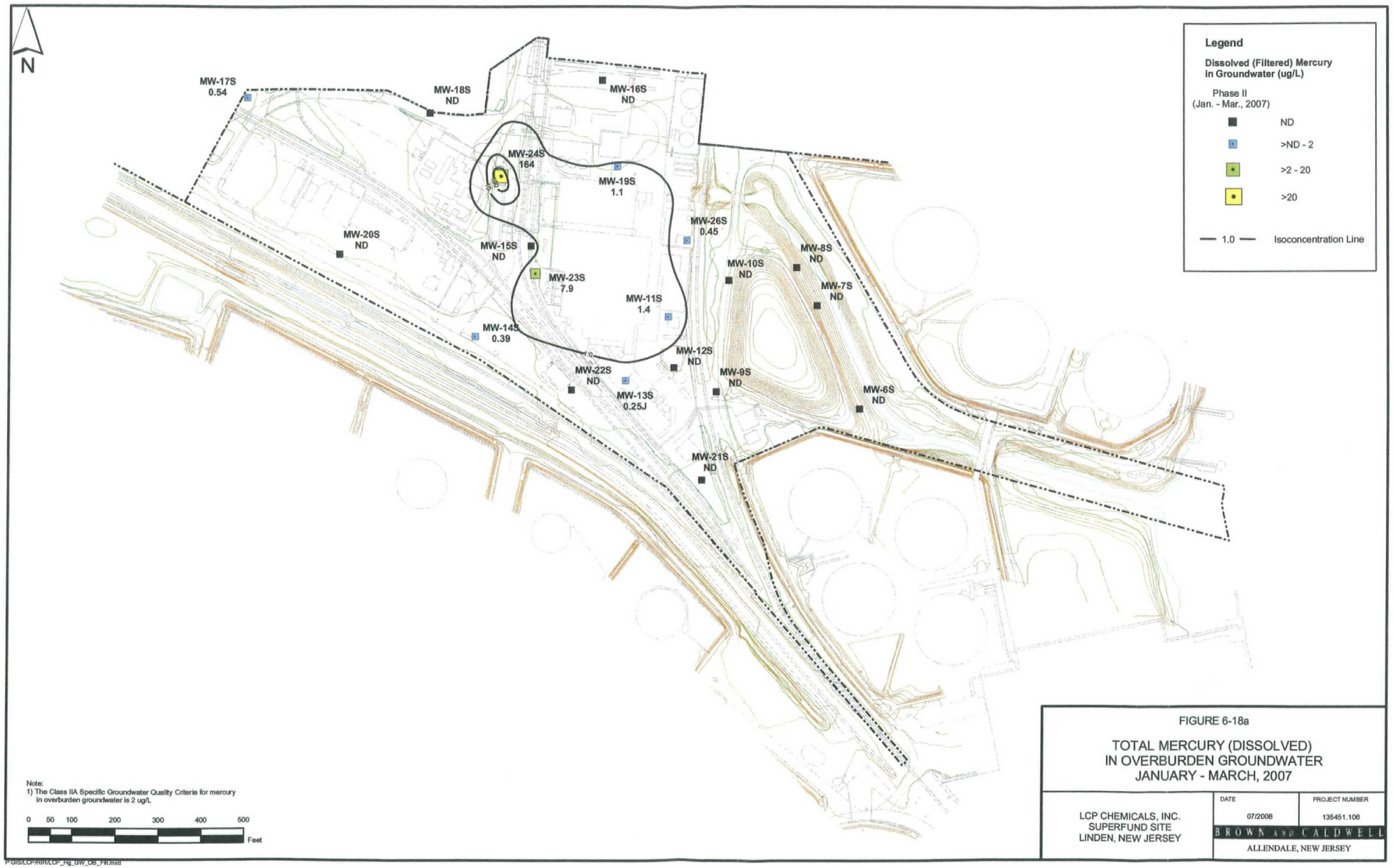


FIGURE 6-18a

TOTAL MERCURY (DISSOLVED)
IN OVERBURDEN GROUNDWATER
JANUARY - MARCH, 2007

LCP CHEMICALS, INC. SUPERFUND SITE LINDEN, NEW JERSEY	DATE 07/2008	PROJECT NUMBER 135451.106
	BROWN AND CALDWELL ALLENDALE, NEW JERSEY	

R2-0003538

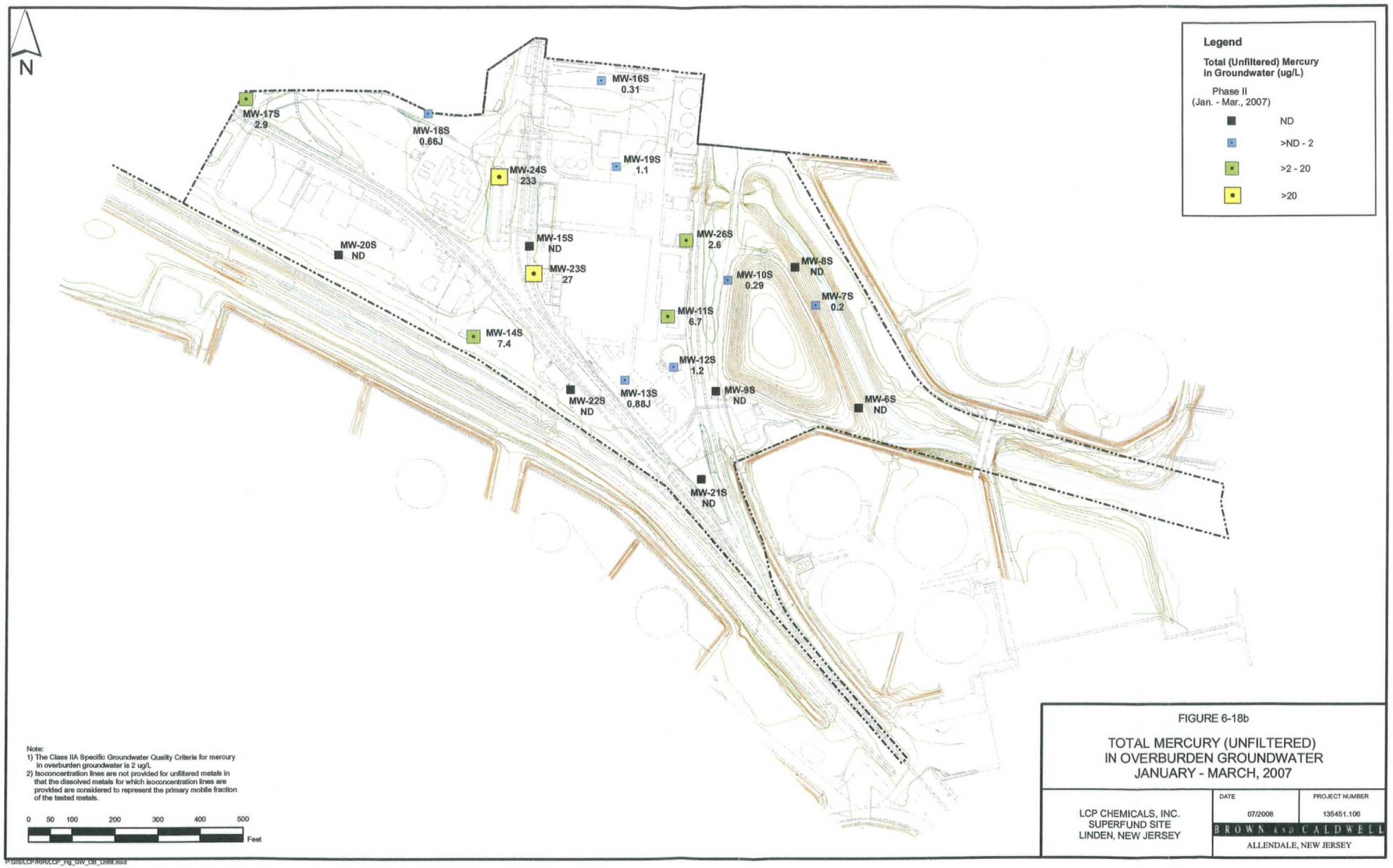


FIGURE 6-18b

TOTAL MERCURY (UNFILTERED)
IN OVERBURDEN GROUNDWATER
JANUARY - MARCH, 2007

LCP CHEMICALS, INC. SUPERFUND SITE LINDEN, NEW JERSEY	DATE 07/2008	PROJECT NUMBER 135451.106
	BROWN AND CALDWELL ALLENDALE, NEW JERSEY	

R2-0003539

Exhibit B

CONTRACT FOR SALE AND PURCHASE OF

CHLORINE GAS AND CAUSTIC SODA

THIS AGREEMENT made this 21st day of July, 1972, by and between LINDEN CHLORINE PRODUCTS, INC., a Delaware corporation, P. O. Box 484, Linden, New Jersey (hereinafter called"Seller"), and KUEHNE CHEMICAL COMPANY, INC., a New Jersey corporation, having an office at 878 Woodruff Lane, Elizabeth, New Jersey (hereinafter called "Buyer"),

WHEREAS, Seller will operate a chlorine caustic plant in Linden, New Jersey on premises to be owned by it which are being purchased from GAF Corporation; and

WHEREAS, Buyer will operate a sodium hypochlorite manufacturing plant at Linden, New Jersey located on certain premises to be leased from Seller immediately adjoining the premises on which shall be located Seller's chlorine caustic plant; and

WHEREAS, Seller will manufacture chlorine gas and caustic soda and Buyer will use chlorine gas and caustic soda in its production; and

WHEREAS, Seller is willing to sell to Buyer and Buyer is willing to purchase from Seller chlorine gas and caustic soda on the terms and conditions hereinafter set forth;

NOW, THEREFORE, the parties hereby agree as follows:

1. Seller hereby agrees to sell to Buyer and Buyer agrees to purchase from Seller all Buyer's requirements of chlorine gas during the term of this agreement and any renewals hereof.

2. Buyer's requirements of chlorine gas are estimated to be a minimum of 8,000 tons and a maximum of 15,000 tons per annum during the first year of this Agreement and during each year thereafter as the parties hereto shall mutually determine.

3. The price of chlorine gas to be purchased by Buyer hereunder shall be the then current competitive price of Seller for chlorine gas to sodium hypochlorite manufacturers and chlorine repackagers, f.o.b. Seller's plant, Linden, New Jersey, less three allowances as follows:

A. an equipment allowance of $4.00 per ton,

B. a liquefaction and tailgas chlorine allowance of $2.50 per ton, and

C. a handling allowance of $1.00 per ton.

4. Seller hereby also agrees to sell to Buyer and Buyer agrees to purchase from Seller all Buyer's requirements of caustic soda during the term of this Agreement and any renewals hereof.

5. Buyer's requirements of caustic soda are estimated to be a minimum of 9,600 tons and a maximum of 18,000 tons per annum during the first year of this Agreement and during each year thereafter as the parties hereto shall mutually determine.

6. The price of caustic soda to be purchased by Buyer hereunder shall be the then current competitive price of Seller for caustic soda to other resellers and/or sodium

hypochlorite manufacturers, f.o.b. Seller's plant, Linden, New Jersey, less a handling allowance of $1.00 per ton.

7. Buyer agrees to give Seller reasonable notice of the time when shipments of chlorine gas and/or caustic soda will be required and further agrees to distribute its orders for these products in equal monthly quantities to the extent its needs will permit.

8. Delivery of the chlorine gas and caustic soda will be made by means of pipelines running from Seller's plant to Buyer's plant. For these purposes, Seller shall install and maintain, at its cost and expense, such pipelines as may mutually be agreed upon from time to time running from Seller's chlorine-caustic plant to the boundary line of Seller's property and Buyer shall install and maintain, at its cost and expense, such pipelines as may be mutually agreed upon from time to time running from the boundary line of Buyer's premises to Buyer's plant. If either party fails to maintain its pipelines, the other party may, at its option, do so, and charge the costs thereof to the other party. If for any reason other than the fault of Seller an alternate means of delivery shall become necessary, it is expressly agreed and understood that in such event all transportation charges on deliveries hereunder shall be borne by Buyer.

9. Notwithstanding anything hereinabove contained to the contrary, Buyer agrees to take from Seller all the

tail gas chlorine produced at Seller's plant in Linden, New Jersey during the term of this agreement and any renewals hereof, at the price per ton hereinabove specified; PROVIDED, HOWEVER, if for any reason Buyer cannot take all of the tail gas chlorine produced by Seller then Buyer shall pay to Seller as additional rent in accordance with paragraph 5 of the Lease dated even date herewith between Seller, as Landlord, and Buyer, as Tenant, covering Buyer's plant located in Linden, New Jersey, an amount equal to the difference for the prior month between seven (7%) per cent of Seller's total chlorine production calculated in tons and the number of tons of tail gas chlorine taken by Buyer, if any, multiplied by the then current per ton price of chlorine as provided in paragraph 3 hereof. The parties agree that the aforesaid seven (7%) per cent figure shall be reduced in the future if it becomes technically and economically feasible to do so.

10. Seller may at any time include in or add to the price, all taxes, excises, or other charges imposed by law on or incident to the production, sale, transportation, delivery or use of the chlorine gas and/or caustic soda purchased hereunder by Buyer.

11. Seller's weights shall govern except that in the case of proven error, adjustments shall be made.

12. The terms of payment for the chlorine gas and caustic soda furnished hereunder shall be net cash in thirty (30) days from the date of invoice.

13. Risk of loss and responsibility for chlorine gas and caustic soda delivered hereunder through pipelines shall pass to Buyer when said chlorine gas or caustic soda passes into that portion of the pipeline maintained by Buyer. Risk of loss and responsibility for chlorine gas and caustic soda sold hereunder and delivered other than through pipelines shall pass to Buyer when placed in Buyer's vehicles or those of a common carrier.

14. SELLER WARRANTS THAT THE CHLORINE GAS AND CAUSTIC SODA SHALL BE OF MERCHANTABLE QUALITY. SELLER DOES NOT MAKE AND IT IS NOT TO BE HELD LIABLE FOR ANY WARRANTY OF FITNESS FOR A PARTICULAR USE OR PURPOSE OR FOR ANY OTHER WARRANTY OF ANY KIND WHATSOEVER, EXPRESS OR IMPLIED, EXCEPT AS SET FORTH IN THE PRECEDING SENTENCE. BUYER ASSUMES ALL RISK AND LIABILITY WITH RESPECT TO RESULTS OBTAINED BY THE USE OF THE CHLORINE GAS AND/OR CAUSTIC SODA WHETHER USED ALONE OR IN COMBINATION WITH OTHER PRODUCTS. NO CLAIMS OF ANY KIND WHATSOEVER, WHETHER BASED ON BREACH OF WARRANTY, THE ALLEGED NEGLIGENCE OF SELLER, OR OTHERWISE, WITH RESPECT TO THE CHLORINE GAS OR CAUSTIC SODA DELIVERED OR FOR FAILURE TO DELIVER ANY CHLORINE GAS OR CAUSTIC SODA SHALL BE GREATER IN AMOUNT THAN THE PURCHASE PRICE HEREUNDER OF THE CHLORINE GAS OR CAUSTIC SODA IN RESPECT OF WHICH DAMAGES ARE CLAIMED, AND SELLER SHALL NOT BE LIABLE FOR ANY INCIDENTAL OR CONSEQUENTIAL DAMAGES; AND FAILURE OF BUYER TO GIVE WRITTEN NOTICE OF CLAIM WITHIN THIRTY DAYS AFTER DELIVERY OF THE CHLORINE GAS OR CAUSTIC SODA OR THE DATE STATED FOR DELIVERY,

AS THE CASE MAY BE, SHALL CONSTITUTE AN IRREVOCABLE ACCEPTANCE OF THE CHLORINE GAS OR CAUSTIC SODA AND A WAIVER BY THE BUYER OF ALL CLAIMS WITH RESPECT TO SUCH CHLORINE GAS OR CAUSTIC SODA. ANY ACTION FOR BREACH OF THIS CONTRACT MUST BE COMMENCED WITHIN ONE YEAR AFTER THE CAUSE OF ACTION HAS ACCRUED.

15. Seller certifies that in the manufacture of the chlorine gas and caustic soda it will comply with the Fair Labor Standards Act of 1938, as amended.

16. If Buyer fails to perform any of the terms of this contract, Seller may defer shipment until such failure is made good, or may treat such failure as final refusal to accept further shipments and may cancel this contract. Seller may terminate this contract if Buyer becomes insolvent, assigns its property for the benefit of creditors or is adjudicated a bankrupt. Either party's waiver of any breach, or failure to enforce any of the terms and conditions of this contract, at any time, shall not in any way affect, limit, or waive such party's right thereafter to enforce and compel strict compliance with every term and condition of the contract.

17. The Buyer shall not assign this contract or any right or obligation hereunder without the express prior written consent of the Seller and any purported assignment shall be void and ineffective, but this contract shall be binding upon and inure to the benefit of the successors of the parties hereto.

18. The construction, performance and completion of this contract are to be governed by the law of the State of New Jerse

To the extent that the contract provisions hereof may vary from the Uniform Commercial Code of the State of New Jersey or any other jurisdiction, the contract provisions hereof shall govern. This contract is intended by the parties hereto as the final expression of their agreement and is a complete and exclusive statement of the terms hereof notwithstanding any oral representations or statements to the contrary heretofore made. No modification or release of this contract shall be effective unless in writing signed by the other party and specifically stating it is such modification or release.

19. (a) Except for the purchase of tail gas chlorine as provided in paragraph 9 above, neither party is to be liable for delay or failure to perform in whole or part by reason of contingencies beyond its control, whether herein specifically enumerated or not, including among others, act of God, force majeure, war, acts of war, revolution, civil commotion, riot, acts of public enemies, blockade or embargo, delays of carriers, car shortage, fire, explosion, breakdown of plant, strike, lockout, labor dispute, casualty or accident, earthquake, epidemic, floods, cyclone, tornado, hurricane or other windstorm, lack or failure of sources of supply of labor, raw materials, power and supply, or excessive cost thereof, contingencies interfering with the production or with customary or usual means of transportation of the chlorine gas and caustic herein described, or with the supply of coal or fuel or of any raw material of which said articles are a product or which may

be used in their manufacture, or where material covered hereby is not manufactured by Seller than lack or failure of sources of supply of said material or by reason of any law, order, proclamation, regulation, ordinance, demand, requisition, or requirement or any other act of any governmental authority, national, state or local, including court orders, judgments, or decrees, or any other cause whatsoever, whether similar or dissimilar to those above enumerated, beyond the reasonable control of the party. Quantities so affected may be eliminated by the Seller from this contract without liability.

(b) If by reason of any of the foregoing contingencies or of national emergency, the quantities of material covered hereby, or any materials used in the production thereof, reasonably available to Seller shall be less than its total need for its own use and for sale, Seller may distribute its available supply among any or all purchasers or its own departments, divisions, or branches, on any basis it deems fair and practical, without liability for any failure to perform this contract which may result therefrom.

20. All notices required under the terms of this Agreement shall be given and shall be complete by mailing such notices by certified or registered mail, return receipt requested, to the address of the parties as shown at the beginning of this Agreement, or to such other address as shall be designated in writing, which notice of change of address shall be given in the same manner.

21. The term of this Agreement shall be for five (5) years commencing upon the date Seller commences the operation

of its chlorine caustic plant in Linden, New Jersey, and ending on the fifth anniversary date hereof and, in the absence of written notice to the contrary given by either party hereto to the other at least six (6) months prior to the end of the initial term, shall renew automatically for a one year term upon the same terms and conditions as are set forth herein and for like terms of one year thereafter in the absence of written notice to the contrary given by either party to the other at least six months prior to the expiration of any one year term.

22. Notwithstanding anything hereinabove provided, if for any reason Seller is unable to supply to Buyer sufficient chlorine gas and caustic soda hereunder in any month to enable Buyer to manufacture in that month an amount of sodium hypochlorite equal to not more than the arithmetic monthly average of its production in the prior six months, Seller will pay to Buyer the difference in any calendar year (up to a maximum of eighteen (18%) percent of the then current minimum number of tons of chlorine gas and of caustic soda pursuant to paragraphs 2 and 5 hereof) between the then current per ton price of chlorine gas and caustic soda as provided in paragraphs 3 and 9 hereof and the price per ton that Buyer is required to pay to obtain the same from other sources.

23. Seller shall be responsible for disposing of any mercury residue in the chlorine and caustic soda furnished to Buyer hereunder collected by the Buyer in its equipment.

24. The allowances provided for in paragraphs 3 and 6 shall be adjusted annually on the anniversary date of this Contract to reflect actual costs, including the applicable proportionate share of overhead expenses.

IN WITNESS WHEREOF, the parties have interchangeably set their hands and seals or caused these presents to be signed by their proper corporate officers and caused their proper corporate seals to be hereto affixed, the day and year first above written.

ATTEST: LINDEN CHLORINE PRODUCTS, INC.

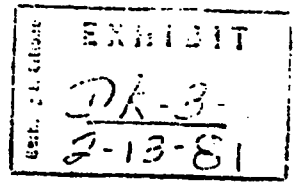
W C Calcott Jr. By C A Hansen Jr.
President

ATTEST: KUEHNE CHEMICAL COMPANY, INC.

Robert J. Schulz By Peter R. Kuehne
President

CONTRACT FOR SALE AND PURCHASE OF

CHLORINE AND CAUSTIC SODA



THIS AGREEMENT made this 25 day of February, 1977, by and between LINDEN CHLORINE PRODUCTS, INC., a Delaware corporation, 14 Commerce Drive, Cranford, New Jersey 07016 (hereinafter called "Seller"), and KUEHNE CHEMICAL COMPANY, INC., a New Jersey corporation, P.O. Box 534, Linden, New Jersey 07036 (hereinafter called "Buyer").

WHEREAS, Seller is in the chemical business and, among other things, operates a chlorine caustic plant in Linden, New Jersey on premises owned by it; and

WHEREAS, Buyer operates a sodium hypochlorite manufacturing plant and chemical resale business at Linden, New Jersey located on certain premises immediately adjoining the premises on which is located Seller's chlorine caustic plant; and

WHEREAS, Seller manufactures chlorine and caustic soda, among other things, and Buyer, among other things, uses chlorine and caustic soda in the manufacture of sodium hypochlorite and also resells chlorine and caustic soda; and

WHEREAS, Seller is willing to sell to Buyer and Buyer is willing to purchase from Seller chlorine and caustic soda, on the terms and conditions hereinafter set forth;

NOW, THEREFORE, the parties hereby agree as follows:

1. Seller hereby agrees to sell to Buyer and Buyer

agrees to purchase from Seller all of Buyer's requirements of chlorine for Buyer's market area served by Buyer's Linden location during the term of this Agreement and any renewal hereof.

2. Buyer's requirements of chlorine for manufacture of sodium hypochlorite and for resale in 150 pound cylinders and 1 ton containers are estimated to be approximately 18,000 tons for the calendar year 1977 and during each year thereafter unless the parties hereto shall mutually determine otherwise. Buyer shall attempt to consume requirements in a uniform manner and shall furnish Seller with approximate monthly requirements and update same quarterly on March 1, June 1, September 1 and December 1 of each year. Notwithstanding anything herein contained to the contrary, requirements and supply commitments can be changed at any time by mutual agreement of the parties.

3(a). The price of chlorine to be purchased by Buyer hereunder for use in the manufacture of sodium hypochlorite shall be the then current competitive price for chlorine to other industrial consumers, F.O.B. Seller's plant, Linden, New Jersey, less an allowance of $35.00 per ton for gaseous pipeline delivery and tailgas consumption. The $35.00 per ton allowance will be adjusted upward or downward annually based on changes in Buyer's labor costs and adjusted upward or downward annually based on changes in Buyer's transportation costs. Adjustments in the allowance based on changes in labor and transportation costs shall be effective the first day of

each fiscal year of Buyer commencing July 1, 1977 to reflect increases or decreases in the labor costs and transportation costs during the prior fiscal year. The price of chlorine purchased by Buyer for the manufacture of sodium hypochlorite shall be adjusted monthly effective January 1, 1977 in accordance with Schedule A.

3(b). The price of liquid chlorine to be purchased by the Buyer hereunder for resale in 150 pound cylinders and 1 ton containers shall be Seller's then current F.O.B. posted market price less an equipment allowance of $4.00 per ton.

4. Seller hereby also agrees to sell to Buyer and Buyer agrees to purchase from Seller all of Buyer's requirements of caustic soda for the manufacture of sodium hypochlorite at Buyer's Linden, New Jersey location and for resale during the term of this Agreement and any renewal hereof.

5(a). Buyer's requirements of caustic soda for the manufacture of sodium hypochlorite are estimated to be approximately 18,000 tons for the calendar year 1977 and during each year thereafter unless the parties hereto shall mutually determine otherwise. Buyer shall attempt to consume requirements in a uniform manner and shall furnish Seller with approximate monthly requirements and update same quarterly on March 1, June 1, September 1 and December 1 of each year. Notwithstanding anything herein contained to the contrary, requirements and supply commitments can be changed at any time by mutual agreement of the parties.

5(b). Buyer's requirements of caustic soda for resale are estimated to be approximately 500 tons for the calendar

year 1977 and during each year thereafter unless the parties hereto shall mutually determine otherwise. Buyer shall attempt to consume requirements in a uniform manner and shall furnish Seller with approximate monthly requirements and update same quarterly on March 1, June 1, September 1 and December 1 of each year. Notwithstanding anything herein contained to the contrary, requirements and supply commitments can be changed at any time by mutual agreement of the parties.

6(a). The price of caustic soda to be purchased by Buyer hereunder for the manufacture of sodium hypochlorite shall be the then current competitive price for caustic soda to other industrial consumers, F.O.B. Seller's plant, Linden, New Jersey.

6(b). The price of caustic soda to be purchased by the Buyer hereunder for resale shall be Seller's then current F.O.B. posted market price less a five (5%) percent resale allowance.

7. Either party may give thirty (30) days written notice to the other party of a change in the then current competitive price for either product to other industrial consumers, and at the expiration of said thirty (30) days the change shall take effect with respect to the price for the purchase of such product for use in the manufacture of sodium hypochlorite unless the other party within fifteen (15) days after receipt of such notice disagrees that such a change in the then current competitive price exists. In the event of such disagreement, the dispute shall be submitted within

fifteen (15) days to a mutually agreeable third party for binding arbitration and decision within thirty (30) days thereafter. During such arbitration, the previous established price shall be used for the purpose of this Agreement, however, the disputed sum shall be paid by the disputing party into an escrow account. Within ten (10) days after the arbitrator renders his decision, the escrow funds will be disbursed so as to implement the decision. The costs of arbitration shall be shared equally by the parties. The decision of the arbitrator shall be final and binding on the parties, and no suit at law or equity shall be instituted by either party other than to enforce the award of the arbitrator.

8. Delivery of the chlorine and caustic soda will be made by means of a pipeline running from Seller's plant to Buyer's plant. For these purposes, Seller shall install and maintain, at its cost and expense, such pipelines as may mutually be agreed upon from time to time running from Seller's chlorine caustic plant to the boundary line of Seller's property and Buyer shall install and maintain, at its cost and expense, such pipelines as may be mutually agreed upon from time to time running from the boundary line of Buyer's premises to Buyer's plant. If for any reason an alternate means of delivery shall become necessary, it is expressly agreed and understood that in such event all transportation charges on deliveries hereunder shall be borne by the responsible party.

9(a). Notwithstanding anything hereinabove contained to the contrary, Buyer agrees to take from Seller that number

of tons of tailgas chlorine produced at Seller's plant in Linden, New Jersey, during the term of this Agreement and any renewals hereof, equivalent to the lesser of (i) ten (10%) percent of Seller's total chlorine production calculated in tons at (ii) fifty (50) tons per day at the price per ton hereinabove specified in Paragraph 3(a); PROVIDED, HOWEVER, if for any reason Buyer cannot take such required quantities of tailgas chlorine from Seller, Buyer will pay to Seller an amount equal to the Seller's then current posted market price per ton of chlorine multiplied by the number of tons of chlorine by which Seller reduced its chlorine production as a result of Buyer's failure to take from Seller such required quantities of tailgas chlorine.

9(b). Seller agrees to use its best efforts to maintain its chlorine liquefaction facilities in good order. Seller also agrees to minimize tailgas production when and if requested by Buyer. Any extra cost incurred by Seller in minimizing tailgas production shall be for Buyer's account with its prior agreement.

10. Seller may at any time include in or add to the price, all taxes, excises or other charges imposed by law on or incident to the production, sale, transportation, delivery or use of the chlorine and/or caustic soda purchased hereunder by Buyer.

11. Buyer's weights will be used but Seller has the option to use its weights and Seller's weight shall govern except that in the case of proven error, adjustments shall be

made.

12. The terms of payment for the chlorine and caustic soda furnished hereunder shall be net cash in thirty (30) days from the date of invoice.

13. Risk of loss and responsibility for chlorine and caustic soda delivered hereunder through pipelines shall pass to Buyer when said chlorine and caustic soda passes into that portion of the pipeline maintained by Buyer. Risk of loss and responsibility for chlorine and caustic soda sold hereunder and delivered other than through pipelines shall pass to Buyer when placed in Buyer's vehicles or those of a common carrier.

14. SELLER WARRANTS THAT THE CHLORINE AND CAUSTIC SODA SHALL BE OF MERCHANTABLE QUALITY. SELLER DOES NOT MAKE AND IT IS NOT TO BE HELD LIABLE FOR ANY WARRANTY OF FITNESS FOR A PARTICULAR USE OR PURPOSE OR FOR ANY OTHER WARRANTY OF ANY KIND WHATSOEVER, EXPRESS OR IMPLIED, EXCEPT AS SET FORTH IN THE PRECEDING SENTENCE. BUYER ASSUMES ALL RISK AND LIABILITY WITH RESPECT TO RESULTS OBTAINED BY THE USE OF THE CHLORINE AND/OR CAUSTIC SODA WHETHER USED ALONE OR IN COMBINATION WITH OTHER PRODUCTS. NO CLAIMS OF ANY KIND WHATSOEVER, WHETHER BASED ON BREACH OF WARRANTY, THE ALLEGED NEGLIGENCE OF SELLER, OR OTHERWISE, WITH RESPECT TO THE CHLORINE OR CAUSTIC SODA DELIVERED OR FOR FAILURE TO DELIVER ANY CHLORINE OR CAUSTIC SODA SHALL BE GREATER IN AMOUNT THAN THE PURCHASE PRICE HEREUNDER OF THE CHLORINE OR CAUSTIC SODA IN RESPECT OF WHICH DAMAGES ARE CLAIMED, AND SELLER SHALL NOT BE LIABLE FOR ANY

INCIDENTAL OR CONSEQUENTIAL DAMAGES; AND FAILURE OF BUYER TO GIVE WRITTEN NOTICE OF CLAIM WITHIN THIRTY (30) DAYS AFTER DELIVERY OF THE CHLORINE OR CAUSTIC SODA OR THE DATE STATED FOR DELIVERY, AS THE CASE MAY BE, SHALL CONSTITUTE AN IRREVOCABLE ACCEPTANCE OF THE CHLORINE OR CAUSTIC SODA AND A WAIVER BY THE BUYER OF ALL CLAIMS WITH RESPECT TO SUCH CHLORINE OR CAUSTIC SODA. ANY ACTION FOR BREACH OF THIS CONTRACT MUST BE COMMENCED WITHIN ONE (1) YEAR AFTER THE CAUSE OF ACTION HAS ACCRUED.

15. Seller certifies that in the manufacture of the chlorine and caustic soda it will comply with the Fair Labor Standards Act of 1938, as amended.

16. Either Seller or Buyer may terminate this contract if the other becomes insolvent, assigns its property for the benefit of creditors or is adjudicated as bankrupt. Either party's waiver of any breach, or failure to enforce any of the terms and conditions of this contract, at any time, shall not in any way affect, limit or waive such party's right thereafter to enforce and compel strict compliance with every term and condition of the contract.

17. The Buyer shall not assign this contract or any right or obligation hereunder without the express prior written consent of the Seller and any purported assignment shall be void and ineffective, but this contract shall be binding upon and inure to the benefit of the successors of the parties hereto.

18. The construction, performance and completion of

this contract are to be governed by the law of the State of New Jersey. To the extent that the contract provisions hereof may vary from the Uniform Commercial Code of the State of New Jersey or any other jurisdiction, the contract provisions hereof shall govern. This contract is intended by the parties hereto as the final expression of their agreement with respect to the sale and purchase of chlorine and caustic soda from and after the date hereof and is a complete and exclusive statement of the terms hereof notwithstanding any oral representations or statements to the contrary heretofore made. No modification or release of this contract shall be effective unless in writing signed by the other party and specifically stating it is such modification or release.

19(a). Neither party is to be liable for delay or failure to perform in whole or part by reason of contingencies beyond its control, whether herein specifically enumerated or not, including among others, acts of God, force majeure, war, acts of war, revolution, civil, delays of carriers, car shortage, fire, explosion, breakdown of plant, strike, lockout, labor dispute, casualty or accident, earthquake, epidemic, floods, cyclone, tornado, hurricane or other windstorm, lack or failure of sources of supply of labor, raw materials, power and supply, or excessive cost thereof, contingencies interfering with the production or with customary or usual means of transportation of the chlorine and caustic herein described, or with the supply of coal or fuel or of any raw materials of which said articles are a product or which may be used in their manufacture,

or where material covered hereby is not manufactured by Seller, then lack or failure of sources of supply of said material or by reason of any law, order, proclamation, regulation, ordinance, demand, requisition, or requirement or any other act of any governmental authority, national, state or local, including court orders, judgments, or decrees, or any other cause whatsoever, whether similar or dissimilar to those above enumerated, beyond the reasonable control of the party. Quantities so affected may be eliminated from this contract without liability.

19(b). Buyer recognizes that the consumption of Seller's tailgas chlorine is critical to the continued economical operations of Seller's chlorine caustic plant. Buyer agrees to maintain its equipment in good working order and to provide spares throughout the systems and on shelf to help insure continuous operation. Buyer also agrees to maintain emergency reserves of four (4) hours of caustic which can be used to neutralize chlorine to permit orderly shutdown of the Seller's plant in the event of failure of the Buyer's system. Buyer further agrees to keep Seller informed if it anticipates any problems with respect to its continued operation.

20. All notices required under the terms of this Agreement shall be given and shall be completed by mailing such notices by certified or registered mail, return receipt requested, or presented in person with a written receipt. Mailing of notices shall be to the address of the parties

shown at the beginning of this Agreement, or to such other address as shall be designated in writing.

21. The term of this Agreement shall be for the period commencing upon the date hereof and ending December 31, 1982 (the "Initial Term"), and, in the absence of written notice to the contrary given by either party hereto to the other at least six (6) months prior to the end of the Initial Term, shall renew automatically for a one (1) year term upon the same terms and conditions as are set forth herein and for like terms of one (1) year thereafter in the absence of written notice to the contrary given by either party to the other at least six (6) months prior to the expiration of any one (1) year term.

22. Notwithstanding anything hereinabove provided, if for any reason Buyer has ordered but Seller is unable to supply to Buyer sufficient chlorine and caustic soda hereunder in any month to enable Buyer to manufacture in that month an amount of sodium hypochlorite equal to its production for that same month in the prior calendar year, Seller will pay to Buyer the difference in any calendar year (up to a maximum of eighteen (18%) percent of the then current minimum number of tons of chlorine and of caustic soda pursuant to Paragraphs 2 and 5 hereof) between the then current per ton price of chlorine and caustic soda as provided in Paragraphs 3(a) and 6(a) hereof and the price per ton that Buyer is required to pay to obtain the same from other sources. Seller also agrees that it will maintain during the term of this Agreement a sufficient

inventory of chlorine and caustic soda to satisfy at least three (3) days of Buyer's requirements.

23. Seller shall be responsible for disposing of any mercury residue in the chlorine and caustic soda furnished to Buyer hereunder collected by the Buyer in its equipment. Seller shall be responsible for disposal of any tailgas bleach in excess of Buyer's requirements.

24. The parties understand and agree that Seller and E. I. duPont deNemours & Company, Inc. ("duPont") have entered into a Sales Agreement for a term ending December 31, 1982, pursuant to which Seller is to furnish duPont with chlorine and caustic soda produced at its chlorine caustic plant in Linden, New Jersey. In view of the said Sales Agreement, and notwithstanding anything contained to the contrary in this Agreement, the parties hereto agree that if for any reason Seller's production of chlorine and/or caustic soda is insufficient to satisfy the requirements of both duPont and Kuehne under their respective agreements with Seller, Seller shall distribute its available supply of chlorine other than tailgas chlorine between Kuehne and duPont on the basis of 67% to duPont and 33% to Kuehne and Seller shall distribute its available supply of caustic soda between Kuehne and duPont on the basis of 60% to duPont and 40% to Kuehne.

25. This Agreement shall supersede as of the date hereof the Contract of Sale and Purchase of Chlorine Gas and Caustic Soda dated July 21, 1972 between the parties, and the Amendment thereto dated August 20, 1973.

IN WITNESS WHEREOF, the parties have interchangeably set their hands and seals or caused these presents to be signed by their proper corporate officers and caused their proper corporate seals to be hereto affixed, the day and year first above written.

ATTEST:

A.R. Maynard

LINDEN CHLORINE PRODUCTS, INC.

By W C Calvert
Executive Vice President

ATTEST:

Marie Fawson

KUEHNE CHEMICAL COMPANY, INC.

By
Secretary / Treasurer

SCHEDULE A

Effective January 1, 1977, the price for chlorine purchased for use in the manufacture of sodium hypochlorite shall be reduced on any given date for all such chlorine supplied hereunder by Seller to Buyer which is produced on that date in accordance with the following schedule if the amount of carbonate "B" content in the chlorine produced on that day exceeds five (5) grams per liter for twelve (12) or more continuous hours:

Carbonate Reading	Reduction per each ton produced during continuance of such reading
5 to 5.99	$ 1.00
6 to 6.99	2.00
7 to 7.99	4.00
8 to 8.99	6.00
9 to 9.99	8.00
10 and above	10.00 or, at Buyer's option, Buyer reserves the right to process the chlorine and return it to Seller for its disposal.

Exhibit C

LINDABURY, McCORMICK & ESTABROOK
A Professional Corporation
53 Cardinal Drive
P.O. Box 2369
Westfield, New Jersey 07091
(908)233-6800
Attorneys for Kuehne Chemical Company, Inc.

UNITED STATES ENVIRONMENTAL
PROTECTION AGENCY

IN RE:	:	
LCP Chemical Site, Linden Union County, New Jersey	:	**RESPONSE TO INFORMATION REQUEST LETTER**

Kuehne Chemical Company, Inc. ("Kuehne") in response to the Information Request Letter dated February 27, 1998 says:

GENERAL OBJECTIONS

The answers provided herein are all made subject to the following general objections:

1. Kuehne objects to these requests for information to the extent that they request information concerning Kuehne's operations at locations other than the LCP Chemical site in Linden, Union County, New Jersey.

2. Kuehne objects to these request for information to the extent that they are unlimited in scope with respect to time and request that Kuehne provide information about its operations at times when it did not conduct any operations at the LCP Chemical site.

3. Kuehne objects to these requests for information to the extent that they call for the production of information about other entities which is beyond Kuehne's knowledge or control.

4. Kuehne objects to these requests for information to the extent that they seek to require Kuehne to provide, obtain and/or create information and/or documents which are not within their knowledge, possession or control.

5. Kuehne objects to these requests for information to the extent that they seek to require the production or disclosure of information and/or documents relating to activities conducted by Kuehne at locations other than the LCP Chemical site and operations not related to the LCP Chemical site.

6. Kuehne objects to these requests for information to the extent that they seek to require the disclosure of trade secrets.

7. Kuehne objects to these requests for information to the extent that they seek to require the disclosure of information and/or documents which are protected by the attorney-client and other privileges.

8. Kuehne objects to these requests for information to the extent that they seek to require the respondent to form and or divulge legal conclusions and/or require specialized knowledge to formulate a response.

9. Kuehne objects to these requests for information to the extent that they seek to require the disclosure of information and/or documents beyond that required by applicable law.

10. The responses set forth herein are based upon a review of currently available records within the time allotted by the Request For Information, as extended, and are based upon a good faith inquiry and the best information available.

11. Kuehne objects to these requests for information in that the definitions and instructions are overly broad, burdensome, and vague.

RESPONSES

1. a. Kuehne Chemical Company, Inc.

   b. Peter Kuehne - President
   c/o Kuehne Chemical Company, Inc.
   86 Hackensack Avenue
   South Kearny, New Jersey 07032

   c. Kuehne Chemical Company is a New Jersey corporation and its Registered Agent is Donald F. Nicolai, Esq., Lindabury, McCormick & Estabrook, 53 Cardinal Drive, Westfield, New Jersey 07091.

   d. See Exhibit A annexed hereto, which consists of the following documents:

      i. Certificate of Incorporation of Kuehne Chemical Company, Inc. dated June 6, 1966;

      ii. Certificate of Amendment to the Certificate of Incorporation of Kuehne Chemical Company, Inc. dated September 14, 1977;

      iii. Certificate of Merger of Kuehne Leasing, Inc. into Kuehne Chemical Company, Inc. dated June 22, 1981;

      iv. Certificate of Amendment to the Certificate of Incorporation of Kuehne Chemical Company, Inc. dated December 29, 1982; and

      v. Certificate of Merger of Prime Gas, Inc. and The Chloramone Corporation into Kuehne Chemical Company, Inc. dated May 11, 1989.

e. Kuehne objects to this request for information in that it is unlimited in scope with respect to time or with respect to the location of operations and because it calls for the formation of a legal conclusion. Without waiving the foregoing or any other objection, Kuehne states that during the period of time when it occupied a portion of the LCP Chemical site, there were no affiliated or subsidiary entities of Kuehne which conducted operations at the LCP Chemical site and Kuehne was not related or affiliated to any other entity which conducted operations at the LCP Chemical site. In anticipation of the closure of Kuehne's operations at a portion of the LCP Chemical site, Kuehne purchased assets including the real property of Marzahl Chemical, Inc. in 1980 and relocated its operations to 86 Hackensack Avenue, South Kearny, New Jersey. In 1981, Kuehne merged with Kuehne Leasing, Inc., a paper company which never conducted any operations.

2. Kuehne states upon present recollection, information and belief that during the period of time when it occupied a portion of the LCP Chemical site (as specified in the answer to 3 below), Kuehne was not required to have any permit issued pursuant to the Resource Conservation and Recovery Act. During the period of operations at the LCP Chemical site, Kuehne did have identification numbers pursuant to the Federal Insecticide, Fungicide and Rodenticide Act as follows: sodium hypochlorite - 35317-20001, and chlorine - 35317-1.

3. Kuehne states that during the period from approximately 1973 to January 1981, it leased a portion of the LCP Chemical site from Linden Chlorine Products, Inc. Attached hereto as Exhibit B are copies of the following documents:

a. Contract For Sale and Purchase Of Chlorine Gas And Caustic Soda by and between Kuehne Chemical Company, Inc. and Linden Chlorine Products, Inc. dated July 21, 1972; and

b. Contract For Sale and Purchase Of Chlorine Gas And Caustic Soda by and between Kuehne Chemical Company, Inc. and Linden Chlorine Products, Inc. dated February 4, 1977.

4. Kuehne states that it occupied a portion of the LCP Chemical site from approximately 1973 to 1981.

5. Kuehne states that during the period of time when it occupied a portion of the LCP Chemical site, its operations at the LCP Chemical site were as follows:

(a) from approximately 1973 to January, 1981 Kuehne's operations consisted primarily of the following:

i. receipt, via pipeline from Linden Chemical Products, Inc., of chlorine and caustic soda;

ii. blending of chlorine and caustic soda to produce sodium hypochlorite;

iii. storage of sodium hypochlorite and shipment of same in bulk via tank trailers.

In and after 1972 from time to time and at the request and direction of Linden Chlorine Products, Inc., Kuehne transported chlorine and caustic soda via tank trailers to Linden Chlorine Products, Inc.'s customers, loaded and unloaded Linden Chlorine Products, Inc.'s storage facilities, serviced Linden Chlorine Products, Inc.'s railroad tank cars, loaded Linden Chlorine Products, Inc.'s railroad tankers, loaded barges at Linden Chlorine Products, Inc.'s docks, and loaded the trucks and railroad tank cars of Linden Chlorine Products, Inc.'s customers, all with respect to chlorine and caustic soda.

(b) In or about 1977 Kuehne began packaging some of the chlorine received via pipeline from Linden Chlorine Products, Inc. in one ton cylinders known as tank containers for sale to Kuehne's customers.

(c) In or about 1978 or 1979 Kuehne began to resell some of the caustic soda received via pipeline from Linden Chlorine Products, Inc. by directly filling customer's tank trailers.

Sodium Hypochlorite was stored on-site in above ground storage tanks until transported off-site in bulk via tanker trucks.

From approximately 1974 to 1981, the person responsible for managing these operations was Roger Goetzel, Plant Manager. Prior to 1974, the persons responsible for managing these operations were Cliff Jacobs and Joe Larkin.

6. Kuehne states that during the period of time when it occupied a portion of the LCP Chemical site, the principal substances purchased, generated, used and/or handled in the course of Kuehne's operations at the LCP Chemical site were: chlorine, caustic soda; and sodium hypochlorite. Sodium hypochlorite was produced by Kuehne by blending chlorine and caustic soda. Chlorine was received by pipeline from Linden Chlorine Products, Inc. Caustic soda was also received by pipeline from Linden Chlorine Products, Inc.

a. Respondent objects to this request for information as overly broad, vague and ambiguous in that the terms "chemicals", "halogenated" and "non-halogenated" are not defined. Without waiving the foregoing or any other objection, Kuehne states that the substances set forth in the answer to No. 6 above, were generated, purchased, used and/or transported by Kuehne at or from the portion of the LCP Chemical site occupied by Kuehne from approximately 1973 to January, 1981.

b. Respondent objects to this request for information as overly broad, vague and ambiguous in that the terms "chemicals", "halogenated" and "non-halogenated" are not defined. Without waiving the foregoing or any other objection, Kuehne states that chlorine and caustic soda were handled for the purpose of resale and producing sodium hypochlorite, and that sodium hypochlorite was produced and handled for sale to others.

c. Respondent objects to this request for information as overly broad, vague and ambiguous in that the terms "chemicals", "halogenated" and "non-halogenated" are not defined. Without waiving the foregoing or any other objection, Kuehne states that it believes that it no longer possesses any records indicating the quantities of chlorine, caustic soda or sodium hypochlorite handled during its operations at a portion of the LCP Chemical site, and should such records be discovered, this response will be supplemented. Based upon present recollection, Kuehne manufactured approximately 18,000,000 to 25,000,000 gallons of sodium hypochlorite annually from 1972 to 1981.

7. During the time period when Kuehne occupied a portion of the LCP Chemical site, Kuehne stored sodium hypochlorite (finished product awaiting sale to customers) in above ground storage tanks. Kuehne did not dispose of hazardous substances, hazardous wastes or "CERCLA waste material". Approximately 200,000 gallons of above ground storage capacity was utilized for finished product. Raw materials were not stored but were received via pipeline from Linden Chlorine Products, Inc.

8. Kuehne objects to this request for information as overly broad, vague and ambiguous in that the term "hazardous materials" is not defined. Without waiving the foregoing or any other objection, Kuehne states that it used above ground storage tanks with an approximate aggregate capacity of 200,000 gallons to store sodium hypochlorite, prior to bulk sale to customers.

a. Information on installation date, exact number, size, location and/or configuration of these above ground storage tanks is not presently available or recalled.

b. Storage of sodium hypochlorite.

c. See 8(b) above.

d. The units identified in the answers to No. 8 a-c above were moved from the LCP Chemical site to Kuehne's current location at 86 Hackensack Avenue, South Kearny, New Jersey in or about January, 1981.

9. Documents presently available include the following which are attached hereto as Exhibit C:

a. Transportation And Service Contract dated July 21, 1972;

b. Letter from Linden Chlorine Products, Inc. dated 1977 regarding the sale of sodium hypochlorite to Merck & Co., Inc.;

c. Letter from Linden Chlorine Products, Inc. dated 1977 regarding the sale of sodium hypochlorite to The Chlorox Company;

d. Letter from Linden Chlorine Products, Inc. dated 1977 regarding the production of sodium hypochlorite for the account of Linden Chlorine Products, Inc.; and

e. Letter from Linden Chlorine Products, Inc. dated 1977 regarding the sale of chlorine and caustic soda by Linden Chlorine Products, Inc. to Kuehne.

See also the documents attached hereto as Exhibit B.

10. Kuehne objects to this request for information to the extent that they are unlimited in scope with respect to time and request that Kuehne provide information about its operations at time when it did not conduct any operations at or related to the LCP Chemical site. Kuehne's operations at the LCP Chemical site did not result in any release of hazardous substances, hazardous wastes or "CERCLA waste material", except that based upon present recollection, information and belief, there were a few occasions during the

period from 1972 to 1981 when small amounts of chlorine were released into the atmosphere and when small spills of caustic soda and sodium hypochlorite would occur and be neutralized, diluted and broken down into salt and water. The exact number, dates and quantities of such discharges are not presently available or recalled.

11. The following persons have knowledge of Kuehne's production of sodium hypochlorite during its occupancy of a portion of the LCP Chemical site: 1974 - 1981 - Roger Goetzel, Vice-President, Kuehne Chemical Company, Inc., c/o Lindabury, McCormick & Estabrook, 53 Cardinal Drive, Westfield, New Jersey 07091; prior to 1974 - Joe Larkin - deceased and Cliff Jacobs, currently employed by Kuehne Chemical Company, Inc. as Executive Vice-President of Research and Development.

12. See the documents previously referred to in the answers to requests 3 and 9.

13. See the documents previously referred to in the answers to requests 3 and 9.

14. No such records are presently available or recalled, except such documents as have been submitted herewith.

15. No.

16. Specific instances are not presently available or recalled, however, Linden Chlorine Products, Inc. manufactured chlorine using mercury cell electrolysis. Wastes from Linden Chlorine Products, Inc.'s chlorine production were placed into a lagoon on the Linden Chlorine Products, Inc. property. Prior to Linden Chlorine Products, Inc.'s operations, GAF also produced chlorine using mercury cell electrolysis.

17. See the documents previously referred to in the answers to requests 3 and 9.

18. Roger Goetzel
Vice President, Kuehne Chemical Company, Inc.
c/o Lindabury, McCormick & Estabrook
53 Cardinal Drive
PO Box 2369
Westfield, New Jersey 07091
(908) 233-6800

Mr. Goetzel has personal knowledge of the answers to 1 through 19.

19. Answers were prepared based upon review of available documentation submitted herewith, and with the assistance of counsel.

CERTIFICATION OF ANSWERS TO REQUEST FOR INFORMATION

State of New Jersey

County of _____

I certify under penalty of law that I have personally examined and am familiar with the Information submitted in this document (response to EPA Request for Information) and all documents submitted herewith, and that based on my inquiry of those individuals immediately responsible for obtaining the information, I believe that the submitted information is true, accurate, and complete, and that all documents submitted herewith are complete and authentic unless otherwise indicated. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment.

Roger Goetzel
NAME (print or type)

Vice-President
TITLE (print or type)

SIGNATURE

Sworn to before me this
27th day of April, 1998

Notary Public

BOYD L HUNNAMAN
NOTARY PUBLIC OF NEW JERSEY
My Commission Expires June 1 2002

Exhibit D

U.S. Environmental Protection Agency
Federal Register Environmental Documents
Recent Additions | Contact Us | Search: GO
EPA Home > Federal Register > FR Years > FR Months > FR Days > FR Daily > National Emission Standards for Hazardous Air Pollutants: Mercury Emissions From Mercury Cell Chlor-Alkali Plants

National Emission Standards for Hazardous Air Pollutants: Mercury Emissions From Mercury Cell Chlor-Alkali Plants

[Federal Register: July 3, 2002 (Volume 67, Number 128)]
[Proposed Rules]
[Page 44671-44713]
From the Federal Register Online via GPO Access [wais.access.gpo.gov]
[DOCID:fr03jy02-27]

ENVIRONMENTAL PROTECTION AGENCY
40 CFR Part 63
[FRL-7236-6]
RIN 2060-AE85

National Emission Standards for Hazardous Air Pollutants: Mercury Emissions From Mercury Cell Chlor-Alkali Plants

AGENCY: Environmental Protection Agency (EPA).
ACTION: Proposed rule.

SUMMARY: This action proposes national emission standards for hazardous air pollutants (NESHAP) for mercury cell chlor-alkali plants. The proposed standards would limit mercury air emissions from these plants. The proposed standards would implement section 112(d) of the Clean Air Act (CAA) which requires all categories and subcategories of major sources and area sources listed in section 112(c) to meet hazardous air pollutant emission standards reflecting the application of the maximum achievable control technology (MACT). The proposed standards would reduce nationwide mercury emissions from these sources by about 4,100 kilograms per year (kg/yr) (9,100 pounds per year (lb/yr)) from the levels allowed by the existing mercury NESHAP.

Mercury is a neurotoxin that accumulates, primarily in the especially potent form of methylmercury, in aquatic food chains. The highest levels are reached in predator fish species. Mercury emitted to the air from various types of sources (usually in the elemental or inorganic forms) transports through the atmosphere and eventually deposits onto land or water bodies. When mercury is deposited to surface waters, natural processes (bacterial) can transform some of the mercury into methylmercury that accumulates in fish. The health effect of greatest concern due to methylmercury is neurotoxicity, particularly with respect to fetuses and young children.

DATES: Comments. Submit comments on or before September 3, 2002.

Public Hearing. If anyone contacts the EPA requesting to speak at a public hearing by July 23, 2002, a public hearing will be held on August 2, 2002.

ADDRESSES: Docket. Docket No. A-2000-32 contains supporting information used in developing the proposed standards for the mercury cell chlor-alkali plant source category. The docket is located at the U.S. EPA, 401 M Street, SW., Washington, DC 20460 in Room M-1500, Waterside Mall (ground floor), and may be inspected from 8:30 a.m. to 5:30 p.m., Monday through Friday, excluding legal holidays.

FOR FURTHER INFORMATION CONTACT: Mr. Iliam Rosario, Metals Group, Emission Standards Division (C439-02), U.S. EPA, Research Triangle Park, North Carolina 27711, telephone number: (919) 541-5308, facsimile: (919) 541-5600, electronic mail address: rosario.iliam@epa.gov.

SUPPLEMENTARY INFORMATION:

Comments. Comments and data may be submitted by electronic mail (e-mail) to: a-and-r-docket@epa.gov. Electronic comments must be submitted as an ASCII file to avoid the use of special characters and encryption problems and will also be accepted on disks in WordPerfect [reg] format.

All comments and data submitted in electronic form must note the docket number: Docket No. A-2000-32. No confidential business information (CBI) should be submitted by e-mail. Electronic comments may be filed online at many Federal Depository Libraries.

Commenters wishing to submit proprietary information for consideration must clearly distinguish such information from other comments and clearly label it as CBI. Send submissions containing such proprietary information directly to the following address, and not to the public docket, to ensure that proprietary information is not inadvertently placed in the docket: OAQPS Document Control Office (C404-02) Attention: Iliam Rosario, Metals Group, Emission Standards Division, U.S. EPA, Research Triangle Park, NC 27711. The EPA will disclose information identified as CBI only to the extent allowed by the procedures set forth in 40 CFR part 2. If no claim of confidentiality accompanies a submission when it is received by the EPA, the information may be made available to the public without further notice to the commenter.

Public Hearing. Persons interested in presenting oral testimony or inquiring as to whether a hearing is to be held should contact Cassie Posey, telephone number: (919) 541-0069. Persons interested in attending the public hearing must also call Cassie Posey to verify the time, date, and location of the hearing. The public hearing will provide interested parties the opportunity to present data, views, or arguments concerning the proposed emission standards.

Docket. The docket is an organized and complete file of all the information considered by the EPA in rule development. The docket is a dynamic file because material is added throughout the rulemaking process. The docketing system is intended to allow members of the public and industries involved to readily identify and locate documents so that they can effectively participate in the rulemaking process. Along with the proposed and promulgated standards and their preambles, the contents of the docket will serve as the record in the case of judicial review. (See section 307(d)(7)(A) of the CAA.) The regulatory text and other materials related to this rulemaking are available for review in the docket or copies may be mailed on request from the Air Docket by calling (202) 260-7548. A reasonable fee may be charged for copying docket materials.

World Wide Web Information. In addition to being available in the docket, an electronic copy of today's proposed rule will also be available through EPA's World Wide Web site. Following signature, a copy of the rule will be posted on our policy and guidance page for newly proposed or promulgated rules: http://www.epa.gov/ttn/oarpg. The web site provides information and technology exchange in various areas of air pollution control. If more information regarding the web site is needed, call our web site help line at (919) 541-5384.

Regulated entities. Entities potentially affected by this action include plants engaged in the production of chlorine and caustic in mercury cells. Regulated categories and entities include those sources listed in the primary Standard Industrial Classification code 2812 or North American Information Classification System code 325181.

This description is not intended to be exhaustive, but rather provides a guide for readers regarding entities likely to be regulated by this action. To determine whether your facility, company, business, organization, etc., is regulated by this action, you should carefully examine Sec. 63.8182 of the proposed rule. If you have questions regarding the applicability of this action to a particular entity, consult the person listed in the preceding FOR FURTHER INFORMATION CONTACT section.

Outline. The information presented in this preamble is organized as follows:

[[Page 44673]]

I. Background

A. What Is the Source of Authority for Development of NESHAP?

Section 112 of the CAA contains our authorities for reducing emissions of hazardous air pollutants (HAP). Section 112(d) requires us to promulgate regulations establishing emission standards for each category or subcategory of major sources and area sources of HAP listed pursuant to section 112(c). Section 112(d)(2) specifies that emission standards promulgated under the section shall require the maximum degree of reductions in emissions of the HAP subject to section 112 that are deemed achievable considering cost and any non-air quality health and environmental impacts and energy requirements.

Each national emission standard for hazardous air pollutants (NESHAP) established reflects the maximum degree of reduction in emissions of HAP that is achievable. This level of control is commonly referred to as maximum achievable control technology (MACT).

Section 112(c)(6) requires us to list source categories and subcategories assuring that sources accounting for not less than 90 percent of the aggregate emissions of each of seven specific pollutants (including mercury) are subject to standards under section 112(d) of the CAA.

Mercury cell chlor-alkali plants are among the sources listed to achieve the 90 percent goal for mercury.

B. What Criteria Are Used in the Development of NESHAP?

Section 112(d)(2) specifies that NESHAP for new and existing sources must reflect the maximum degree of reduction in HAP emissions that is achievable, taking into consideration the cost of achieving the emissions reductions, any non-air quality health and environmental benefits, and energy requirements. This level of control is commonly referred to as MACT.

Section 112(d)(3) defines the minimum level of control or floor allowed for NESHAP. In essence, the MACT floor ensures that the standard is set at a level that assures that all affected sources achieve the level of control at least as stringent as that already achieved by the better-controlled and lower-emitting sources in each source category or subcategory. For new sources, the MACT floor cannot

be less stringent than the emission control that is achieved in practice by the best-controlled similar source. The MACT standards for existing sources cannot be less stringent than the average emission limitation achieved by the best-performing 12 percent of existing sources in the category or subcategory (or the best-performing five sources for categories or subcategories with fewer than 30 sources).

In developing MACT, we also consider control options that are more stringent than the floor. We may establish standards more stringent than the floor based on the consideration of cost of achieving the emissions reductions, any non-air quality health and environmental impacts, and energy impacts.

C. What Is a Mercury Cell Chlor-alkali Plant?

1. Mercury Cell Chlor-Alkali Production Facilities

At a mercury cell chlor-alkali plant, mercury cell chlor-alkali production facilities are used to manufacture chlorine and caustic as co-products and hydrogen as a by-product through the electrolytic decomposition of brine in mercury cells. The central unit is the mercury cell which is a device comprised of an electrolyzer (electrolytic cell) and decomposer with one or more end boxes and other components linking them. While each mercury cell is an independent production unit, numerous cells are connected electrically in series to form a cell circuit. Cells are situated in a cell room and typically arranged in two rows separated by a center aisle. The cell room is generally a two-story structure in which mercury cells are housed on the upper floor. The lower floor houses various process and housekeeping functions. The number of mercury cells at a given plant ranges from 24 to 116 and averages 56. A mercury cell involves two distinct reactions which occur in separate vessels. The electrolyzer produces chlorine gas, and the decomposer produces hydrogen gas and caustic solution (sodium hydroxide or potassium hydroxide). The electrolyzer can be described as an elongated, shallow steel trough enclosed by side panels and a top cover. A typical electrolyzer measures about 15 meters (about 50 feet) in length and 1.5 meters (about 5 feet) in width and holds about 3,600 kilograms (around 8,000 pounds) of mercury. The decomposer is a 4-to-5 feet high cylindrical vessel located at the outlet end of the electrolyzer and is usually oriented vertically. The electrolyzer and the decomposer are typically linked by an inlet end box and an outlet end box.

A shallow stream of liquid mercury flows continuously between the

[[Page 44674]]

electrolyzer and the decomposer. The mercury enters the cell at the inlet end box and flows down a slight grade to the outlet end box, where it flows out of the cell into the decomposer. After being processed in the decomposer, the mercury is pumped back to the inlet end box of the cell.

Saturated brine (sodium chloride solution or potassium chloride solution) is fed to the electrolytic cell via the inlet end box and flows toward the outlet end box above the shallow layer of mercury. Both brine and mercury flow beneath dimensionally stable metal anodes, typically made of a titanium substrate with a metal catalyst that are suspended in the electrolyzer top. The flowing mercury serves as the cathode.

Electric current applied between the anodes and the mercury cathode causes a reaction that produces chlorine at the anode, while an alkali metal (sodium or potassium) binds with the mercury as an amalgam at the cathode. The chlorine gas is collected at the top of the cell and

transported to an ancillary gas purification system followed in most cases by a liquefaction facility. The alkali metal/mercury amalgam exits via the outlet end box and enters the decomposer. The brine, whose salt content has been partially depleted in the reaction, also exits the cell via the outlet end box and is transferred to an ancillary brine preparation system.

The decomposer functions as a packed bed reactor in which the alkali metal/mercury amalgam contacts deionized water in the presence of a catalyst. The amalgam reacts with the water, liberating the mercury and yielding caustic soda (sodium hydroxide) or caustic potash (potassium hydroxide) and hydrogen. The caustic and mercury are separated in a trap at the end of the decomposer. The caustic and hydrogen are each transferred to ancillary treatment, and the mercury is pumped back to the inlet end of the cell.

As previously noted, end boxes serve as connections between the electrolyzer and decomposer in a mercury cell. The inlet end box collects and combines raw materials at the inlet end of the cell, and the outlet end box separates and directs various materials out of the cell. An end-box ventilation system, which is present at most but not all plants, evacuates the vapor spaces of the end boxes. The end-box ventilation system also commonly evacuates the vapor space of other vessels and process equipment, such as pump seals, wash water tanks, and caustic tanks and headers. In most cases, mercury contained in this equipment is covered with a layer of water or other aqueous liquid so the air being pulled into the end-box ventilation system is not in direct contact with mercury. However, due to the elevated temperatures in this equipment, particularly end boxes, mercury diffuses through the liquid and is present in the vapor spaces. The concentration of mercury in end-box ventilation systems before any steps are taken to remove mercury varies greatly depending on the vacated equipment. The collected gases are usually cooled and then treated in a mist eliminator and other control equipment prior to being discharged to the atmosphere. It is the mercury remaining in the treated stream that causes the end-box ventilation system vent to be a point source of mercury air emissions for plants that have these systems.

Important ancillary operations at a mercury cell chlor-alkali plant include chlorine purification and liquefaction, brine preparation, caustic purification, by-product hydrogen cleaning, and wastewater treatment.

Chlorine gas is collected under vacuum from each mercury cell and fed into a header system leading out of the cell room. The chlorine then undergoes cooling, mist elimination, and drying. Only trace amounts of mercury remain in the product chlorine gas, typically less than 0.03 parts per million (ppm). Thus, limited mercury emissions are associated with the chlorine purification operation, as this level is achieved without any steps for mercury removal and is consistent with final mercury concentrations for well-controlled gaseous by-product hydrogen streams. In most instances, further cooling, compression, and liquefaction are conducted to obtain liquid chlorine.

Brine flows in a continuous loop through the mercury cells and the brine preparation system which provides clean saturated brine for electrolysis. An important function of the brine system is the removal of impurities naturally associated with salt such as calcium, iron, and aluminum. The presence of these elements can adversely affect cell efficiency. These impurities are removed by the addition of caustic and sodium carbonate which react to form metal precipitates that are removed by filtration. Subsequently, the brine is acidified to remove excess caustic, subjected to heat exchange for temperature adjustment, and returned to the mercury cells as clean saturated brine. Mercury exists in the brine system in the form of dissolved mercuric chloride

and on the order of 3 to 25 ppm. The low vapor pressure of mercuric chloride, which is approximately 30 times lower than that of elemental mercury at 35 deg.C, limits the potential for emissions of mercury from the brine system.

Because the caustic solution produced directly from the decomposer is commercial grade, the only additional treatment needed is mercury removal. The concentration of mercury in the caustic stream leaving the decomposer ranges from about 3 to 15 ppm. Mercury is removed by cooling and filtration. Residual mercury contained in the caustic product is typically around 0.05 ppm.

Hydrogen gas exiting a decomposer contains mercury vapor. A mercury-saturated hydrogen gas stream typically leaves a decomposer at a temperature over 200 deg.F. The mercury concentration of this stream can be as high as 3,500 milligrams per cubic meter (mg/m3). Accordingly, in most situations, each decomposer is equipped with an adjacent cooler through which the hydrogen gas stream is routed to condense mercury and return it to the mercury cell. After initial cooling, the hydrogen gas from each decomposer is collected into a common header. The combined gas is then treated for mercury with additional cooling and adsorption (or absorption) control equipment. The cleaned hydrogen gas is then either burned as fuel in a boiler, transferred to another process as a raw material, or vented directly to the atmosphere. Due to the mercury remaining in the treated stream, the by-product hydrogen stream is a point source of mercury air emissions.

Mercury cell chlor-alkali plants generate a variety of aqueous waste streams that contain mercury and are treated in a wastewater treatment system. These wastewaters originate from a variety of sources, ranging from wastewaters produced from cell room washdowns and cleanup activities to liquids or slurries produced from purged brine from the brine system and backwash water from the filtration equipment used for caustic purification.

Wastewater treatment applied at most mercury cell chlor-alkali plants entails three basic steps. First, sodium hydrosulfide is added to the wastewater (which contains both elemental mercury and mercury compounded as mercuric chloride) to form mercuric sulfide. This compound has a very low vapor pressure which practically eliminates the potential for mercury air emissions from wastewater treatment. Next, the mercuric sulfide is removed through precipitation and filtration which results in a liquid fraction and a mercuric sulfide filter cake. Any dissolved mercury contained in the liquid is removed by treatment in a carbon adsorber prior to being

[[Page 44675]]

discharged in accordance with a plant's discharge permit. The wastewater treatment sludges produced, which consist mainly of the mercuric sulfide filter cake, are classified as hazardous under Resource Conservation and Recovery Act (RCRA) regulations (40 CFR part 261, subpart D). This waste, designated as K106, must be treated for mercury removal prior to disposal or landfilling which generally means high temperature treatment.

2. Mercury Recovery Facilities

Nine mercury cell chlor-alkali plants have mercury recovery facilities on-site to recover elemental mercury from mercury-containing wastes. The wastes treated include those considered K106 wastes, as cited above, and debris and nondebris D009 wastes. The D009 wastes, as classified under RCRA regulations (40 CFR part 261, subpart D), are nonspecific mercury-containing wastes. Debris wastes include any contaminated material or item greater than 2\1/2\ inches in any one dimension, such as hardware, protective gear, piping, and equipment.

Nondebris wastes include graphite from decomposers, cell room sump sludges, spent carbon media from carbon adsorption control devices, and other small solids.

The most commonly used process is thermal recovery (retorting), where mercury-containing wastes are heated to volatilize the mercury which is then condensed and recovered. Six plants each operate a mercury thermal recovery unit. In such a unit, mercury in wastes is driven to the vapor phase at temperatures over 1,000 deg.F inside one or more retorts. The retort off-gas, which is rich in mercury vapor, is routed through cooling equipment to condense the mercury for recovery. However, because it is not possible to condense all of the mercury, the off-gas is typically routed through polishing control equipment to further reduce mercury before the stream is discharged to the atmosphere. This causes the mercury thermal recovery unit vent to be a point source of mercury air emissions. Mercury that never vaporizes and subsequently is neither condensed nor emitted remains in the retort ash, whose mercury content is limited by RCRA land disposal restrictions (40 CFR part 268, subpart E).

Mercury thermal recovery units can be classified, based on the type of retort used, as oven type units and non-oven type units. Three plants have batch oven retorts, and three plants have non-oven retorts (rotary kiln or single hearth). There are differences between the two types related to operating temperature and residence time. Oven retorts have lower operating temperatures (around 1,000 deg.F) and substantially longer residence times (24 to 54 hours) than do kilns which operate at around 1,375 deg.F with residence times approaching 3 hours.

Noteworthy among all six thermal recovery units is the relatively small volume of exhaust gas generated. Volumetric flow rates range from around 50 standard cubic feet per minute (scfm) on one oven type unit to 1,200 scfm on one non-oven type unit. Non-oven type units have higher volumetric flow rates with an average flow rate of 1,000 scfm and a median of 1,075 scfm than oven type units with an average of 130 scfm and a median of 100 scfm.

Two of the nine plants use a chemical process in which mercuric sulfide and elemental mercury in wastes are chemically transformed to mercuric chloride from which elemental mercury is then precipitated. This process differs from mercury thermal recovery in that it is an entirely liquid-phase operation. Moreover, owing to the low vapor pressure of mercuric chloride, the potential for mercury air emissions from this process is limited. Mercury that is not converted and recovered remains in the processed waste materials whose mercury content is limited by RCRA land disposal restrictions for nonthermal mercury recovery processes (40 CFR part 268, subpart E).

The ninth plant uses a batch purification still for recovering elemental mercury only from end-box residues which are high in mercury content. The system involves heating small batches of end-box residues to volatilize the mercury contained followed by a condenser for mercury recovery. This contrasts with thermal recovery units that treat large volumes of low mercury content wastes. The still is operated under vacuum such that the gas stream after the condenser is routed through two carbon adsorption beds in series to limit mercury air emissions. The system is used only a few times per year for 1 to 2 days at a time. Due to the small volumetric flow rate and mercury concentration of the vented stream and limited operation of the still, mercury air emissions are very low from recovery in the batch purification still.

Fugitive mercury emissions can occur due to leaking equipment, liquid mercury spills, or accumulations in many locations throughout mercury cell chlor-alkali production facilities and mercury recovery facilities, including areas of maintenance activities, liquid mercury

Exhibit E

State of New Jersey

OFFICE OF ADMINISTRATIVE LAW

INITIAL DECISION
OAL DKT. NO. EWR 899-82
AGENCY DKT. NO. 82097

DEPARTMENT OF ENVIRONMENTAL PROTECTION,
Petitioner,
v.
KUEHNE CHEMICAL COMPANY,
Respondent.

Priscilla R. Hayes, Deputy Attorney General, on behalf of the petitioner (W. Cary Edwards, Attorney General of New Jersey, attorney)

Richard R. Width, Esq., on behalf of the respondent (Lindabury, McCormick & Estabrook, attorneys)

Record Closed: February 6, 1987 Decided: March 10, 1987

BEFORE STEVEN C. REBACK, ALJ:

STATEMENT OF THE CASE

This is an appeal by respondent, Kuehne Chemical Company (Kuehne), from the allegations and penalty set forth in a Notice of Civil Administrative Penalty Assessment (Notice) issued by petitioner, Department of Environmental Protection, Division of Water Resources (Department or Division), on October 7, 1981, pursuant to its authority under N.J.S.A. 13:1D-1 et seq., N.J.S.A. 13:1B-1-5, and the New Jersey Water Pollution Control Act, N.J.S.A. 58:10A-1 et seq. (the Act).

The Notice charges Kuehne with violating various provisions of the Act as well as various terms and conditions of a National Pollutant Discharge Elimination System (NPDES) permit issued to it by the United States Environmental Protection Agency (EPA) on July 14, 1980. Since April 13, 1982, pursuant to the authority delegated to it by the EPA, the Department, through the Division of Water Resources, has assumed the responsibility for regulating this permit, which is now referred to as the New Jersey Pollutant Discharge Elimination System (NPDES) permit.

The Notice specifically charges Kuehne with violations occurring on two separate occasions—January 15 and 16, and January 25 and 26, 1981—by allegedly discharging effluent with unlawful pH limits and levels of chlorine and caustics, thus contravening the conditions of its NPDES permit as well as applicable provisions of the Act. In addition, the Notice also contends that as a result of the various purported unlawful discharges, Kuehne is guilty of submitting false information on its NPDES permit application also in contravention of the Act.

While the Notice also alleges that Kuehne was guilty of a purported violation of its permit on January 8, 1981, the Deputy Attorney General has affirmatively indicated on the record during the course of the proceedings commenced on April 7, 1986 that th Department would no longer rely upon this allegation in support of its penalty assessment.

As a consequence of these various purported violations, the Department is requesting that a penalty in the amount of $17,500 be assessed against Kuehne based upon the criteria which are set forth in the Act as well as those found in the then applicable regulations, N.J.A.C. 7:14-8.10 et seq.

Kuehne has denied the various factual assertions underlying the allegations contained in the applicable paragraphs of the Notice, contending as well that the legal theories under which the Division seeks to posit liability are misplaced. Specifically, Kuehne has asserted that the "discharge point," which is generally recognized to be the location at which a representative sample of the volume of effluent flow as well as the quantity of pollutants discharged may be measured and sampled, was not where the Division asserts it to be, and, as a consequence, the various proofs offered by the latter which literally and figuratively flow from the very samplings taken and analyses conducted cannot be reasonably correlated to Kuehne's processing operations. Thus

respondent argues, the findings cannot be ascribed to any violation involving it. In addition, Kuehne asserts that even if arguendo the discharge point is located where the Department asserts it to be, various flaws and irregularities in the sampling procedures employed which gave rise to the effluent findings subject to the NPDES permit violations invalidate the various quantifications of pH, chlorine, and caustic upon which the purported violations are posited.

Lastly, Kuehne argues that if, contrary to its substantive arguments directed to the ascertainment of the discharge point as well as to the inherent unreliability of the samplings, it is found that the respondent has contravened its permit as well as applicable provisions of the Act as a consequence of the effluent sampled on January 15-16 and January 25 and 26, 1981, the $17,500 penalty which has been requested in this matter was arbitrarily assessed and should be reduced significantly.

PROCEDURAL HISTORY

This appeal has had an extensive, complex, and protracted procedural history which had its origins immediately following the issuance of the Notice, when a hearing request was made by Kuehne and the matter was transmitted to the Office of Administrative Law as a contested case, pursuant to N.J.S.A. 52:14F-1 et seq. Conferences were conducted over the years before several Administrative Law Judges in which various Deputy Attorneys General appeared on behalf of the Department.

The matter was first brought to my attention when a prehearing conference was commenced on February 27, 1985. As an incident to that conference, I issued a letter on the same date in which the fundamental parameters of the litigation were articulated and a discovery schedule was devised and was to be completed before subsequent conferences were to be conducted. On the latter date, Deputy Attorney General Rebecca Fields, who had a longstanding affiliation with the matter, appeared on behalf of the Department; thereafter she indicated that Deputy Attorney General Hayes, who also appeared, would be assuming control over the litigation.

A second prehearing conference was conducted by telephone on March 22, 1985, during which the schedule for the completion for discovery was revised. I also requested that counsel provide me with an agreed-upon statement of the factual and legal issues in the matter as well as stipulations of fact. It was further agreed that on receipt

of the latter documents, further discussions would ensue. By letter of May 16, 1985 with enclosures, Mr. Width, counsel for Kuehne, submitted the various documents requested both on his own behalf as well as on behalf of the Deputy Attorney General who made her submission directly to her adversary. Thereafter, the prehearing conference was rescheduled to be continued on June 14, 1985; however, the matter was then rescheduled to August 28, 1985.

By August 21, 1985 both parties submitted documents in respect to a motion made by Kuehne for partial summary decision. On August 28, 1985, during the continuation of the prehearing conference, Mr. Width indicated that he would be submitting a second motion, also presumably for partial summary decision and that it was agreed that in the interest of expediency, the disposition of the first motion would be pended until the second motion was forthcoming. Accordingly the schedule in respect to the second motion was revised and it was agreed that Kuehne would submit its second set of motion papers not later than October 1, 1985 and that the Department would respond within the appropriate regulatory time frame. I also directed that discovery be completed not later than October 1, 1985. These various agreed-upon procedures followed the final phase of the substantive prehearing conference which was conducted at the Office of Administrative Law on August 28, 1985. On August 30, 1985 the formal Prehearing Order setting forth these various details as well as setting forth the parameters of the appeal, was issued.

On October 30, 1985 I issued an order and ruling in respect to Mr. Width's motion to amend his earlier motion for partial summary decision. That motion was directed to ascertaining the location of the regulated discharge point of respondent's NPDES permit. The ruling did not touch upon the substantive aspects of Mr. Width's motion; rather, ~~it~~ granted him permission to amend his earlier moving papers submitted on July 26, 1985 so as to include the substantive argument in respect to the location of the discharge point.

By letter directed to counsel on December 9, 1985, I advised that as a result of my review of the various moving papers at issue, it was judgment that genuine and material issues of fact and law were presented. As a consequence and in the interest of expediency, based upon a prior telephone conference conducted on December 6, 1985, Mr. Width agreed to withdraw his pending motion with the right to renew and supplement it during the course of the testimonial phase of the proceeding. As an incident to th

ruling it was also agreed that in the further interests of expediency, efficiency, and economy, the first substantive issue to be addressed at the plenary hearing would be to ascertain the location of the regulated discharge point of respondent's NPDES permit. It was expected that at the conclusion of the Department's case on this issue, Mr. Width would renew his motion for summary decision.

On April 7, 8 and 9, 1986, the plenary hearing commenced at the Office of Administrative Law, Trenton, New Jersey. The Department presented its entire case on those dates and at its conclusion, Mr. Width orally moved for involuntary dismissal (rather than for summary decision). He was advised from the bench that as a consequence of the technical nature of the evidence and the complexity of the issues presented, a decision would be deferred pending the submission of legal memoranda. The case was adjourned pending disposition of the motion.

Respondent's motion for dismissal and supporting papers were received by the Office of Administrative Law (OAL) on April 29, 1986. On May 12, 1986, the Department submitted a cross-motion for partial summary decision. On May 23, 1986, Kuehne submitted its brief opposing the motion for partial summary decision and on June 2, 1986, the Department submitted a memorandum in response to Kuehne's opposition to its motion. It should be noted that the Department at no time submitted a response to Kuehne's motion for dismissal; rather it couched its substantive response in its own motion for partial summary decision.

Immediately upon submission of the various motion papers and responsive documents, I undertook a preliminary review of the arguments, as well as the evidential record that had been generated at the hearing. It became apparent that the Department had created a significant obstacle in respect to fact finding in this matter—particularly in relation to establishing and ascertaining the geographical and physical location of the discharge point—the essence of the argument underlying the motions presented. The primary cause for this obstacle was the Department's failure to offer into evidence an appropriate physical exhibit—a map, drawing, artist's rendition, or other similar visual reference point, which accurately depicted the key elements in this proceeding. As I viewed it, those elements included Kuehne's plant in Linden, New Jersey; the location of that plant in relationship to the Arthur Kill; the location of Linden Chlorine Products (LCP); and the various pipings, waterways, flume, and sample points. Each plays a key role in establishing and resolving the issue of ascertaining the location of the discharge point.

While there was a document referred to during the testimony, exhibit P-8, which apparently set forth the location of the flume and various relevant facilities in the area, that document was never introduced into evidence by the Division but was only available for identification. It is not a part of the official record in this proceeding and I have never acquired possession of it. The dilemma created by the omission of an appropriate document was compounded by continued reference to P-8 for identification during the course of the testimony of Charles Johnson who used it as a point of reference to discuss his visits to the Kuehne plant and the various activities in which he was engaged.

As a result of this problem, I addressed a letter to both Ms. Hayes and Mr. Width on June 16, 1986. In it, I first set forth the unavailability of an appropriate exhibit which would assist in establishing the physical and geographical relationships of the places and activities at issue. I then acknowledged that while the request I was about to make was unusual, that was not a reason to fail to make it:

> I am, of course, fully aware that the Division has rested its case in chief, not only on the issues surrounding the motions, but on all matters arising from the Notice of Penalty. However, I do not perceive the request which I make to be unnecessarily intrusive into the merits of this matter so much as it is demanding a record which is complete and whole. Not only is this record required for me to address the issues on the motion; but as importantly, it is essential for the agency head who will have less intimacy with this matter than I do as the hearer, and who may very well be called upon to address these issues on interlocutory review. [Letter from Administrative Law Judge to counsel, June 18, 1986, at 2].

I thereupon directed the Department to submit into evidence within 10 days from its receipt of the letter "an appropriate physical representation of the vital and material areas of Kuehne and LCP, with particular reference to the Arthur Kill, the flume, the sampling points, the discharge point in dispute, and their relationships to Kuehne's plant and to LCP's plant." Ibid. I further justified my request by informing the parties of the reason for it:

> I want to have before me in this document all that is necessary to serve as an accurate point of reference from which all discussion and analyses may be related—for me, for the agency head, and theoretically, for the courts as well. . . . In my judgment, this directive is a proper exercise of my discretion, prompted by the hope that by generating a more complete record, neither I nor

> anyone else will be required to arrive at a determination on the issues at hand while working in the shadows. Ibid.

Shortly after this letter was sent, my office received a telephone call from the Deputy Attorney General. She indicated that she would be out of state from June 20 through July 6, 1986, and as a result, asked that the submission date for the documents be extended to July 14, 1986. Although I had hoped that the documents would be received by my office, as I had indicated in my letter, within 10 days of receipt of my directive, with the appropriate opportunity for Mr. Width to submit arguments directed both to the document as well as to the procedure, Ms. Hayes' request could not reasonably be denied.

On July 15, 1986, the Department, by cover letter of the Deputy Attorney General, dated July 10, 1986, submitted five charts prepared by Ms. Gloria Tandoi, an employee of the Department, which the Deputy indicated were based on evidence submitted at the hearing. By letter of July 18, 1986, which was received by the OAL on July 26, 1986, Mr. Width submitted legal argument opposing the procedure which had been employed in this matter with respect to additional submissions, as well as a substantive objection to certain aspects of the supplemented documents as submitted.

In respect to Mr. Width's argument that the matter should have ended at the conclusion of the Department's case, he notes:

> We believe that the NJDEP's case was grossly deficient. One of its many deficiencies was its failure to prove and communicate basic situational facts. We are of the opinion that this deficiency should not be remedied by your Honor. The NJDEP should suffer the consequences of its failure to communicate, and this, along with all the other more significant deficiencies, should be considered by your Honor in rendering a decision on the pending motions. We therefore respectfully object to the opportunity given by your Honor to the NJDEP to present additional proofs. [Letter to the ALJ, Richard R. Width, Esq., July 18, 1986, at 2].

While I appreciated the arguments offered by Mr. Width in this regard and while they were certainly reasonable, in this particular instance, they were rejected and his objection overruled. In the first instance, what I called for was not in the nature of additional evidence or new information which was not elicited at hearing. Rather, what I directed the Department to submit was a physical, visual, articulation and point of reference to what had already been testimonially generated at hearing. In that regard, I

do not believe that anything that was presented was new, created surprise, o unreasonably embellished upon or added to the spoken words of the Department's witnesses. Secondly, the courts have viewed the Administrative Law Judge to be an extension of the agency head in respect to rulemaking and factfinding. In that regard, by directing the Department to provide additional information by way of a visual dimension and perspective is to provide the agency head—in this instance the Commissioner of the Department of Environmental Protection—with as complete a picture and record as can be available, so that he may be in a position to decide the case cumulatively and comprehensively rather than with a constrictive view which would have resulted had the exhibits not been requested.

In respect to the substance of the documents themselves, there is no serious attack on their accuracy except for the last document in the packet, the closeup of the Kuehne and LCP operations which I referred to as the "Key" exhibit in that while it is untitled, it is "keyed" to six specific areas or activities on point. Mr. Width noted what in his judgment are some inaccuracies in the exhibit as well as some prejudicial nomenclature. Those objections were held to go to weight rather than to admissibility. For purposes of ruling on the motions, I accepted them as authentic and I marked each the documents collectively as exhibit P-12 in evidence as follows:

P-12A - Map of Union County and the approximate location of the Kuehne/LCP site

P-12B - United States Department of the Interior, geogological survey map, with particular reference to the location of the Kuehne/LCP site

P-12C - Diagram of the Linden Chlorine Products facility

P-12D - Enlargement of portions of P-12C

P-12E - Key exhibit

One further irony in respect to the deficiency of the Department's case as originally presented manifests itself: exhibits P-12C, D and E all refer to "R-5 in evidence" as their source. There is no R-5 in evidence; exhibit R-5 was a documen

offered for identification only. Since the respondent, Kuehne, had not even commenced its case at the time of the motion, that should not have come as a surprise.

Accordingly, having received the various documents submitted by the Department on July 15, 1986, and having received and considered the letter memorandum submitted by Mr. Width in opposition on July 22, 1986, the record on the motions closed on the latter date, July 22, 1986.

On August 19, 1986 I issued a 15-page ruling which denied both motions. In it, Kuehne's assertion that the location of the discharge point at issue was within its process area at a point where cooling water was discharged from a vertical pipe was rejected. It was concluded inter alia that the discharge point at issue was where the Department asserted it to be—at the only location from which a representative sample could be taken given the factual matrix as it had thus far been established: the discharge point was ascertained to be below the manhole (See P-12E, key 2) downstream from where the concrete and PVC pipe enter the flume (P-12E at key 3 and 4). See, letter ruling, August 19, 1986, at 14. Accordingly the motion for involuntary dismissal made by Kuehne was denied.

In addition, the cross-motion which was contemporaneously made by the Department for partial summary decision on the issue of the discharge point was denied in that it was apparent that genuine issues of material facts had been challenged by Kuehne and under the principles appropriate to addressing a motion for summary decision such issues raised by the party against whom the motion was made warranted its denial.

To the best of my knowledge, neither party sought interlocutorily review of this ruling and order.

On September 3, 1986, several weeks subsequent to the issuance of this letter ruling and order, I advised the parties by letter that the plenary hearing would continue in December 1986. Accordingly the respondent presented its case on December 16, 17 and 18, 1986 at the Office of Administrative Law, Mercerville, New Jersey. Following its completion, the Department offered rebuttal witnesses and evidence and the testimonial phase of the proceeding concluded on December 18, 1986. On that date a briefing schedule was devised. It was agreed that the parties would concurrently submit memoranda and/or legal briefs not later than January 19, 1987 and that any replies would

be submitted one week thereafter on January 26, 1987, at which time the record in th proceeding was to close.

Several weeks after the conclusion of the testimonial phase of the proceeding, my office received a telephone request from the Deputy Attorney General which sought to extend the briefing schedule. I asked her to place the request in writing and she did. Thus by letter of January 13, 1987, which was received by my office on the following day, Ms. Hayes requested both on her behalf as well as Mr. Width's an extension, which was granted.

Thereafter on January 28, 1987, I received the initial submissions from both counsel. On January 30, 1987 I also received copies of the regulations which are no longer in effect but which at the time of the issuance of the Notice were in effect and were applicable to the assessment of the penalty in the matter, N.J.A.C. 7:14-8.1 et seq. They had been inadvertently omitted from the Deputy Attorney General's submission. On February 5, 1987 I received a letter memorandum from the Deputy Attorney General in response to the posthearing submission of Kuehne. On the following day, February 6, 1987, I received the final submission in the matter, Mr. Width's reply brief in response to the Department's initial brief. Thus the record in this matter closed on the latter dat February 6, 1987.

ISSUES AND BURDEN OF PROOF

The fundamental issues presented on this appeal concern whether the proofs establish that on January 15 and 16, 1981 and January 25 and 26, 1981, Kuehne discharged effluents which exceeded the limits of its NPDES permit and whether it discharged pollutants ~~which were~~ were not listed in the permit. More specifically, these fundamental issues can be particularized as follows: (1) Was the "discharge point" utilized by the Department, which was directly correlated to the samples of effluent taken on its behalf, properly ascertained? (2) If the discharge point was properly ascertained, was the sampling of effluent which was taken on behalf of the Department properly conducted and were the results of those samplings accurate and reasonably reliable? (3) As a consequence of the proofs, can it also be established that Kuehne is responsible for submitting false information on its NPDES permit application? (4) Should the various purported violations be established, is the penalty which the Department seeks to assess

against Kuehne for its purported misconduct reasonable, appropriate, and consistent with the regulatory and statutory scheme in place at the time of the issuance of the Notice?

In respect to each of the foregoing issues, the burden of proof rests with the Department: it must establish the factual assertions which underlie the various allegations in the Notice by a preponderance of the relevant credible evidence.

THE FACTS

Many of the facts presented in this matter are not in serious dispute. Where, however, there is a disagreement between the parties, particularly in respect to ascertaining the discharge point, I shall set forth the adversarial basis of the dispute, my resolution of the controversy, and an analysis in support of the ultimate finding derived. Accordingly, I find:

For more than one-half century, the respondent, Kuehne Chemical Company, Inc., has been in the business of manufacturing and producing chlorine bleach. In 1973, it opened its processing plant in Union County, Linden, New Jersey, on property owned by and leased from Linden Chlorine Products, Inc. (LCP). LCP was also engaged in a similar and related business venture on the same site which it shared with its tenant, Kuehne. Kuehne's principal process was the absorption of chlorine into sodium hydroxide solution which results in the production of sodium hypochlorite—which to the layman is known as chlorine gas. LCP at this same site and at about the same time engaged in the process of producing chlorine as gas and then liquifying it.

From about the time that Kuehne first commenced operations on the LCP site, the two companies entered into something in the nature of a symbiotic relationship. Representatives of the lessor, LCP, approached a Kuehne representative, requested that one of the respondent's corporate principals enter into a joint venture with LCP involving various aspects of both corporate operations and an agreement was struck. As a result, from 1973 through 1974, Kuehne utilized LCP's residual gas ("tail") resulting from its production process and from it manufactured hypochlorite. Kuehne also performed various technical services for LCP, apparently as a consequence of some inexperience by the technical staff of LCP at the site.

As a result of the similarities of the chemical processes engaged in both by respondent and LCP, the chemicals utilized, and the resulting chemical reactions, as well as the duality of various parts of the physical plant, it is clear that where Kuehne's processing terminated and LCP's began was not always easily ascertainable.

Two other factors result in a blurring of the distinctions between the operations of the two companies. The entire site—including LCP's and Kuehne's processing facilities—no longer exists. Kuehne terminated its activities in January 1981, immediately subsequent to the allegations set forth in the Notice; LCP terminated its operations not long thereafter. As a result, in order to ascertain the exact circumstances underlying the allegations, there is no longer available the physical plant at which all the relevant incidents are alleged to have occurred. Secondly, even at the time of the inspections of the operations by Department representatives, which were made contemporaneous with the allegations, many of the operative elements giving rise to the assertions were not directly observable: by the very nature of the allegations as well as the chemical processes involved, various discharge pipes of both companies were underground and as a result, barring excavation of those pipes which was never fully completed, and tracing purported illegal discharges from a stream back to its source, th conclusions in respect to what was being discharged and the source of such discharge must in part be based upon inference, circumstantial deduction, and, to some extent, conjecture.

The element of motive also creates potential ambivalencies. LCP and Kuehne had a major falling out in their relationship beginning in 1974. The facts underlying it resulted ultimately in litigation being instituted by LCP in 1980 (R-7). To this day, it is apparent that at least from the perspective of Kuehne representatives, there is a deep and abiding animus existing among the various individuals involved.

As a result of these various factors, it is not unreasonable to conclude that at the time that the wrongdoing is alleged to have occurred, LCP could have been motivated to cause Kuehne problems. Indeed, it was representatives of LCP who first brought the alleged unlawful discharges to the attention of Department representatives: paragraph 4 of the Notice indicates that it was on January 1, 1981 that "LCP officials observed the discharges of effluent from Kuehne's outfall DSN001 which they believe might have violated Kuehne's NPDES permit limitations." Also, the various chemical analyses which serve as the exclusive basis for the alleged unlawful discharges at issue were perform

by independent chemists at LCP's own laboratory on site. Paragraph 6 of the Notice also refers to the company performing the analyses, Garden State Laboratories, as "consultants for LCP."

Thus to an extent, and based upon the foregoing, one theory offered by Kuehne in defense of the allegations set forth in the Notice is that even if arguendo it were determined that various unlawful chemical discharges were found on site, significant questions should be raised as to whether they can be attributed to Kuehne's activities or whether, indeed, they can be ascribed to LCP's. This aspect of the case will be further developed later in this opinion; however, it should be noted that the proofs generated in the record of this proceeding do not support Kuehne's claims under this theory of the case.

The nature of the chemical processes themselves add to the difficulty in establishing causality between purportedly unlawful discharges and their source. Most, if not all of the major pipelines which run from the various processes, both LCP's and Kuehne's, and which eventually lead to various water courses are below ground. Thus, unless there were an entire excavation of the area so that particular pipes could be traced back to their source and visually observed—which did not occur—some degree of inference and speculation must be engaged in to determine these connections.

The issues in respect to the Notice in this matter first crystalized in 1974 when Kuehne commenced the process of permit acquisition. On September 26 of that year, Kuehne applied to the United States Environmental Protection Agency for an NPDES permit (P-2). As will be recalled, prior to April 13, 1980, it was the EPA which retained jurisdiction for such permit. Since that date, however, the Department, through the Division of Water Resources, has assumed full responsibility for the issuance of these permits (now referred to as the New Jersey Pollutant Discharge Elimination System Permit, NJPDES) pursuant to a delegation of authority by the EPA.

Kuehne identified "cooling water" as the only discharge for which permit authorization was sought and as the exclusive effluent which would be released into the surface waters of the State of New Jersey. Cooling water, as its name implies, is generally utilized by a manufacturer to cool down the equipment which is used in its processing operation or to reduce the temperature of other thermal sources at the processing site. Edward Post, Section Chief of Industrial Surface Discharge for the Department, distinguished cooling water from two other types of water effluent—process

and filter backwash water. Process water is identified as water carrying with it the actual waste generated by the industrial process and operation of a facility. Filter backwash is water which is reintroduced into the manufacturing process to purge and filter the liquid flow within that process in reverse so as to discharge and remove from the process equipment the various particles and residues which accumulate as a consequence of the manufacturing operation. Filter backwash water is considered process water and the distinction although not specifically articulated is plain: filter backwash water and process water, both endemic to the manufacturing process, carry with them significantly higher amounts of effluent than cooling water which, in theory, is outside the scope of the actual process of manufacturing. Kuehne explicitly excised from its application for the NPDES permit the discharge of process water.

In addition to delineating the type of discharge, as an incident to the kind of application form then used, Kuehne was also responsible for setting forth the number of discharge points for which application was sought. Respondent indicated that there would be but one separate discharge point and that the receiving waters from it would be the Arthur Kill (P-2). The application also notes, in response to a specific question posed, that the discharge would not contain nor would it be possible for it to contain chlorine as a result of Kuehne's operations (P-2).

Some 6 years after it was applied for (no reasonable explanation for the delay was given), on July 14, 1980, the United States Environmental Protection Agency issued the NPDES permit to Kuehne (P-3). The permit regulated Kuehne's discharge stream and established various limitations of the levels of the various pollutants to be discharged. It established that the paramater for pH was not to be less than 6.0 standard units nor more than 9.0 standard units and required that the discharge be monitored quarterly (P-2 at 2). It also established the paramaters for the discharge of chlorine residual. Kuehne was limited to discharging not more than .002 mg/1 on a 30 day average (P-3 at 17). The permit also required Kuehne to sample its discharge at specific intervals and to report the results both to the EPA and to the Department. The permit also described the point at which the various samples in compliance with the monitoring requirements was to be taken: "at the outfall(s) of discharge serial number(s) 0001" (P-2 at 2). Thus Kuehne was permitted to discharge from a pipe identified as DSN 0001 for the period August 31, 1980 through and inclusive of August 31, 1985 effluent having the following characteristics: the pH shall not be less than 6.0 standard units nor greater than 9.0 standard units; the chlorine residual (total) shall not exceed .002 mg/1 on a 30-day average.

As an incident to its obligations under the permit, Kuehne submitted its first discharge monitoring report to the EPA (P-4) governing the period August 31, 1980 thrugh and inclusive of December 1, 1980. The report thus covers a period of approximately three months immediately preceding the dates on which the various violations in the Notice are alleged to have occurred. By Kuehne's own admission, already in this period its effluent contained levels of chlorine which far exceeded the permit limits of .002 mg/l. The sample measurement taken indicates 6.5 mg/l for the time frame at issue. This alarmingly high deviation from the permit maximum was, to Kuehne's credit, candidly and openly acknowledged by it to the EPA. In addition, Kuehne admitted its inability to account for this high chlorine reading. It notes at the conclusion of the monitoring report: "cannot account for chlorine residual but will investigate cause" (P-4).* Thus well in advance of the date on which the allegation set forth in the Notice occurred, Kuehne was aware as a result of its own monitoring which presumably resulted from samplings taken at the discharge point, that chlorine readings were disturbingly high and, in addition, were unaccounted for. At minimum this should have put Kuehne on notice to investigate to ascertain the cause of these high readings; moreover, it is corroborative of the actions that were subsequently taken by the Department occurring in January 1981 in support of the allegations.

Parameters in respect to both pH and chlorine are established to maintain safe levels of each within the environment. Harvey Klein is the analytical chemist who performed the various samplings at issue and vice president of Garden State Laboratories (Garden State), which has received certification by New Jersey to conduct various samplings and perform various chemical analyses. Garden State specializes in environmental and food analyses. Mr. Klein was personally qualified as an expert in environmental chemistry. In respect to the limits that were established for both pH and chlorine, Mr. Klein made it apparent that chlorine is a highly toxic substance both in its gaseous and liquid states and when it exceeds basic limits, its toxicity can destroy plant and animal life. In respect to pH values, plant and animal life may also be destroyed if the levels maintained are either below or above certain normal parameters. Mr. Klein's activities in respect to sampling on the dates set forth in the Notice will be discussed later in this opinion.

---

*It should be noted that for the same period, the monitoring report states that the average pH reading for the time at issue was within the 6.0 and 9.0 permit parameters.

The Discharge Point

The petitioner's case in respect to establishing the location of the discharge point emanates from visits to the site undertaken by Charles Johnson, who at the time at issue was a senior environmental engineer employed by the Division. Mr. Johnson is no longer an employee of New Jersey. He is currently employed by the Department of Environmental Protection of the State of Connecticut. At the time of his employment with the Department, his responsibilities involved sampling industrial and municipal plants and enforcing state and federal discharge regulations. He is the holder of a bachelor of science degree in civil engineering, which was awarded in 1979. Mr. Johnson visited Kuehne on several occasions when he inspected the facility and took samples of both permitted and purportedly unpermitted discharges.

His first visit to the premises occurred on April 17, 1980, prior to the issuance of the NPDES permit to Kuehne. At that time, Mr. Johnson was instructed by the Department to visit the site after it had received a letter from the EPA indicating that the latter was reviewing Kuehne's permit application. Johnson's responsibility was to determine whether, in fact, discharges that had taken place or were taking plac corresponded to those set forth in Kuehne's permit application.

During this initial visit, Mr. Johnson testified, he had a conversation with a Kuehne official whose name he could not recall who indicated to him that the only source of discharge for which a permit was being sought was "noncontact cooling water." Johnson then took several samples of the discharge from a vertical pipe in the central area of Kuehne's processing facilities. It would be reasonable to assume that Mr. Johnson took samples in the vicinity of what on exhibit P-12E has been keyed as "1"—non-contact cooling water discharge, located within the central area of Kuehne's facilities. As was indicated, Mr. Johnson's visit on April 17, 1980 occurred prior to the permit at issue being awarded to Kuehne. It would also be reasonable to conclude therefore that at the time of this initial visit, Mr. Johnson relied upon the foregoing representations concerning the discharge point and had no other information which would have led him to a contrary conclusion. He then left the facility believing that the permit applied for was for non-contact cooling water only and that the discharge point was in this general area of key "1" as noted on exhibit P-12E.

Because Mr. Johnson believed that the location noted was the discharge point does not, of course, make it the discharge point. In his statement of facts submitted in support of his motion for partial involuntary dismissal, Mr. Width seems to suggest the contrary. He notes that after his visit on April 17, 1980, Johnson:

> went to the Discharge Point, which was in the middle of KCC's process area where KCC's cooling water entered a vertical pipe, and he took a sample from it. Subsequently the permit was issued. All of the state's evidence, both express and implied, clearly establishes the location of the discharge/sampling point as being in the middle of KCC's processing area where cooling waters enters a vertical pipe. [Petitioner's brief in opposition to respondent's motion for summary decision, at 2-3].

Certainly from what precedes this conclusory statement, there has been no evidence which would justify a determination that the appropriate discharge point at issue may be found within Kuehne's process area as noted on P-12E.

As will be recalled, on July 14, 1980 the United States Environmental Protection Agency issued the NPDES permit to Kuehne. The permit regulated Kuehne's discharge stream and established limitations of the levels of the various pollutants at issue which could not be exceeded. It also required Kuehne to sample its discharge at specific intervals and to report the results both to the Environmental Protection Agency and to the Department.

In late 1980, Kuehne's landlord, LCP Chemical Company, complained to the Department about what it believed to be an illegal discharge by Kuehne containing unpermitted levels of pH and chlorine. As a result, the Department again sent Mr. Johnson to the site to investigate. His next recorded visit occurred on January 8, 1981. At that time, Mr. Johnson utilized what he determined to be standard investigatory procedure. Following a conversation with an LCP employee, he traced what he believed to be an illegal discharge stream back to its source. Based upon sampling, Mr. Johnson determined that the illegal discharge had found its way into a flume, a man-made stream directed by a walled, wooden construction, which in this case ultimately connected to an underground tributary of the Arthur Kill. The flume itself is seen at P-12E moving left to right from key numbers 4 through 5. As is also noted, portions of it, presumably represented by the dotted line, are constructed below ground level.

Mr. Johnson followed the flume containing flowing water which traversed the site occupied both by LCP's and Kuehne's facilities. Returning to the discharge area later that evening, he detected what in his opinion was the strong odor of chlorine. He also observed a pipe that was discharging fluids into the flume and that appeared to him to be the source of the discharge complained of. He followed this pipe back to its apparent source and observed a covered manhole. See P-12E, key 2. He removed the cover and observed a plastic or PVC pipe which bisected the manhole and which entered a concrete pipe of larger diameter leading to the flume. See P-91, a photograph of the piping within the manhole, taken by Mr. Johnson during his January 26, 1981 visit.

What Johnson observed and what is confirmed by the photograph is that there is also liquid flowing through the manhole into the concrete pipe which must have entered the manhole from a source other than the plastic pipe. Johnson testified as well that the area immediately surrounding the manhole appeared to be concrete except for a small strip which was apparently disturbed ground covered by gravel running from the manhole to a nearby tank. He further observed that the pipe running from this tank (the pipe extending from the manhole to the flume is represented on P-12E by a heavy dotted line) was connected through a valve to a pipe which entered the ground and appeared to be connected to the plastic pipe which had been observed in the manhole. Exhibit P-9J is a photograph which was taken by Mr. Johnson on January 27, 1981, depicting the valve connected to the pipe entering the ground. The photograph was taken from the location of the manhole itself.

On January 26, 1981, after having made these earlier observations, Mr. Johnson again returned to the Kuehne/LCP site. On that morning he held a conversation with a representative of LCP and a decision was made that the underground pipe leading to ~~the~~ flume would be excavated in order to determine the source of the material flowing from it. Digging commenced and samples from the pipe were taken by Mr. Johnson. Since Johnson determined that the underground pipe connected to a PVC valve which connected to overhead pipes, as seen on P-9J, it became apparent to him that whatever it was that was flowing through these pipes was emanating from Kuehne's processing equipment.

Mr. Johnson testified that he then proceeded to a trailer which housed Kuehne officials and met a man whom he identified as Scott Charlop, the then manufacturing manager for Kuehne. Mr. Johnson questioned Charlop about the undergound pipe and th

connection to Kuehne's manufacturing equipment. Johnson testified that Charlop acknowledged that the PVC pipe which traversed the manhole was connected to Kuehne's processing equipment—specifically its process line where bleach material was filtered—and that the valve was used to release the liquid water which was part of the filter backwashing process utilized by the company whenever the backwash was required as a result of filter clogging. The valve could be opened and material could be introduced through the PVC pipe into the discharge pipe and flow directly to the flume. The connection was utilized in this manner on apparently a regular basis, as often as the filters required flushing and cleaning.

Mr. Charlop also informed Mr. Johnson that a discharge emanating from Kuehne's production area was running through the bottom of the manhole and that the liquid which flowed freely through the manhole was the noncontact cooling water; the liquid emanating through the PVC pipe and bisecting the manhole apparently contained only filter backwash water. These two streams could intersect and comingle only at a point below the manhole since it would only be a point below the manhole that the PVC pipe merged and disgorged into the larger pipe.

In an apparent effort to explain to Johnson how the process worked, Charlop noted that by utilizing the underground piping, the filter backwash water could easily be moved through the manhole pipe and down to the discharge pipe right out to the flume. Mr. Johnson then informed Charlop that the connection was illegal and directed him to sever it.

When he took samples at the site in April 1980, Mr. Johnson utilized a point which was above the manhole, located at a place exhibited at point 1 on Exhibit P-12E since at that time this was the general area which was represented to him as being the discharge point for Kuehne. Once he obtained the information from Scott Charlop, however, and conducted his own independent investigation in January 1981, which indicated to him that Kuehne had a connection directly from its filter backwash process to the pipe running through the manhole and beyond, in order for him to obtain a representative sample of Kuehne's discharge which combined both the noncontact cooling water as well as the filter backwash discharge, such sampling would have to by necessity be taken at a point below the manhole, preferably as Ms. Hayes notes at her brief "where

the discharge pipe flowed into the flume, being as 3 on Exhibit P-12E, and point 5 on Exhibit R-9 (the point later identified by Harvey Klein as flume 5)." Letter brief, DAG Hayes, January 28, 1987, at 9-10.

On the following day, January 27, 1981, Mr. Johnson returned to the Kuehne site and, he testified, noted that the connection had in fact been severed. It was on this date as well that he took some additional photographs of the area, two of which (P-9I and P-9J) were introduced into evidence.

From a factual perspective, respondent has challenged several of the various foregoing assertions. Mr. Width claims, for example, that the hearsay statements provided through Mr. Johnson from Scott Charlop were not as definitive as set forth. Specifically, in Mr. Width's judgment, Mr. Johnson said that a certain valve "could be opened up and material could be moved through the pipe in question." Respondent's brief in opposition to motion for summary decision at 2. My recollection differs from Mr. Width's: the hearsay testimony provided by Johnson was that Charlop indeed informed the latter that the pipe which attached to the valve at issue was used in the filter back-wash process and that the bleach was put through filters to remove particles.

Mr. Width further notes that assuming arguendo that the assertions of Mr. Charlop as provided by Mr. Johnson were as I have previously set them out to be, such testimony should not form the basis of any finding of fact in that it is in the nature of hearsay. Ms. Hayes properly noted that hearsay evidence not subject to any exception to admissibility is still, in and of itself, admissible in an administrative proceeding and that the hearsay nature should go to its weight, not its admissibility. See, N.J.A.C. 1:1-15.8.

The latter assertion is, of course, correct. Indeed, in my judgment Mr. Width did not seriously challenge the admissibility of the hearsay assertion. Furthermore, it would appear that the statement of Charlop, made while he was still in Kuehne's employ, constitutes an exception to the hearsay rule as a vicarious admission, pursuant to R. 63(a) of the Rules of Evidence. Mr. Width also challenged the applicability of this exception based upon his assertion that the very identity of Mr. Charlop as an employee of Kuehne's is itself based upon hearsay. In my judgment the issue of the identity of Scott Charlop is one which, if it was in dispute, was for Kuehne to address. It was not up to the Department to establish more than what it has already offered in ascertaining that Scott

Charlop was who he was represented to be. Subsequent testimony of course, established through respondent's own witnesses that Charlop was indeed who he was purported to be.

Furthermore, whether Scott Charlop's statement is or is not inadmissible hearsay, is non-determinative: regardless of how it is characterized, that evidence (I have concluded in any event that it is subject to the exception to the hearsay rule as embodied in R. 63(a)) corroborated the direct observations of Charles Johnson in respect to the underground pipe leading from the area of Kuehne's processing facility through to the flume, generally from the area marked on exhibit P-12E, key 1 through key 2 through key 4.

Respondent also argued that the location of the discharge point is where it purported it to be—within its process area at a point where cooling water was discharged from a vertical pipe—because that is where it designated the discharge point to be. It asserts that the facts as provided by the Department concerning the underground series of pipes which lead to the flume, traced back to the manhole cover and to the filter backwash valve which is connected to Kuehne's processing facilities, are too tenuous upon which to posit an affirmative finding. Mr. Width argues that there is a lack of competent proof which can factually tie in the various components referred to and establish a legally sufficient nexus between the samples taken and Kuehne's manufacturing process.

Mr. Width is correct in respect to where the documents at issue place the discharge point: there was no specification of either the location or number of discharge points subject to the NPDES permit. Kuehne itself indicated that there would be but one discharge point and that the receiving waters from it would be the Arthur Kill (P-2). It also, as was noted, explicitly set forth on the permit application that the discharge would not contain nor would it be possible for it to contain chlorine as a result of its operation (P-2).

Because, however, the application process which was in place at the time that the NPDES permit was issued to Kuehne was silent in respect to the delineation of the location of the discharge point does not establish nor does it serve as a reasonable justification for the permittee itself to establish what it considers to be the appropriate discharge point. The discharge point, regardless of its particular location, must be the locus from which a representative sample of the volume of effluent flow and the quantity

of pollutants discharged may be taken. See P-2 at 3. The testimony of Charles Johnson, his observations, and the out of court statements offered by Scott Charlop in respect to the manufacturing process of Kuehne prima facie have established that Kuehne's processing tank was connected to the connecting valve, which connected to the underground pipe, which traversed the manhole, carried underground, and discharged into the flume which led ultimately to a tributary of the Arthur Kill.

Diagrammatically, Kuehne's contrary assertions in respect to the location of the discharge point may best be appreciated and observed by an examination of several of the exhibits which respondent itself offered into evidence. Exhibit R-9 presents a more particularized perspective of the site area than does P-12E but it is at the same time harmonious with the latter exhibit. The catch basin, previously memorialized on photograph P-9I may be seen on the lower lefthand portion of R-9 and is noted as such. Exhibit R-9 also depicts the area which Kuehne refers to as its discharge point, marked by a description of where non-contact cooling water may be found. I personally noted this point on R-9.

Testimony was provided by Roger Goetzel which sought to cast doubt on establishing a direct nexus between the catch basin (which ultimately ran into flume 5 as is noted on R-9) and Kuehne's processing facilities. He noted, for example, that he had personally observed the area at issue as the subject of an excavation by LCP thus raising as a possibility that LCP had run lines in the area at issue from its own equipment. Mr. Goetzel also concluded that through the catch basin and thus also through to flume 5 ran piping which carried waste water from the lab and locker rooms of LCP's facility (these facilities are also noted explicitly on R-9). These pipes, Mr. Goetzel testified, in his judgment serviced the sink and shower drains both of the LCP lab and its locker room. He reasserted that the only connection to the catch basin which was ascribable to Kuehne was piping from its cooling towers which transported non-contact cooling waters only. Mr. Goetzel noted that he knew nothing about the PVC pipe shown in photograph P-9I. In reference to the valve seen on P-9J, the witness noted that it had been severed before the photograph had been taken and that it was nonfunctional. By his own acknowledgement, however, at the time at issue, 1980-81, Mr. Goetzel was no longer on site on a daily basis but instead had been moved to Kuehne's executive offices.

Also testifying in respect to the discharge point as well as to other aspects of Kuehne's defenses was Joseph Larkin who for the past six years has been respondent's

manager of business engineering and development. Mr. Larkin provided a technical perspective of Kuehne's operations; his expertise in the area of the production of bleach and the various chemical processes endemic to it was unsurpassed in these proceedings.

Mr. Larkin was responsible for the preparation of exhibits R-14B and R-14C, which essentially depict in schematic form Kuehne's processing facilities at the site as well as segments of the underground drainage and run-off system of interconnected pipes. He also prepared exhibit R-14A which is a schematic diagram of what Kuehne represents to be its discharge pipe. The technical aspects depicted on these exhibits may also be correlated to the overall diagram of the site found on exhibits R-9 and P-12E.

Exhibit R-14A represents, in part, portions of the piping and valve depicted on P-9J. Mr. Larkin indicated that this was a portion of a branch connection of a pipe manifold that was utillized in Kuehne's filter system and installed by respondent as part of a pilot facility. He indicated that the connection was capable of placing material directly into Kuehne's waste stream from any of its filter facilities, specifically unfiltered bleach, material from the wash water tank, material from the filter aid area, material from the filter chamber itself, material from the bleach tanks, and from every other portion of the equipment that is depicted on Exhibit R-14C.

He emphasized, however, that while the connection was not removed (it was not uncommon not to remove nonfunctional piping at Kuehne, Larkin noted) it had never really been functioning on line. He did acknowledge, however, that Kuehne employees may have on occasion used the valve assembly as a "service drain" to channel water through to the drainage system. Further he admitted that it was used on prior occasions in the late 1970's for brief experimentation.

Notwithstanding his expertise, Mr. Larkin was unable to account for the extraordinarily high levels of chlorine concentrate resulting from the sampling conducted by Harvey Klein at flume 5 (assuming the validity of the sampling, which will be discussed hereafter). In addition, Mr. Larkin was apprised during his testimony of the findings as were developed in the letter ruling of August 19, 1986 with particular reference to the narrative of the testimony of Charles Johnson as it related to his conversation with Scott Charlop. It will be recalled that in the letter ruling the following findings were set forth:

> Mr. Johnson testified that he then proceeded to a trailer which housed Kuehne officials and met a man whom he identified as Scott Charlop, then the manufacturing manager for Kuehne. Mr. Johnson held a conversation with Charlop in which he questioned the latter concerning the underground pipe and the connection to the manufacturing equipment of Kuehne. Johnson testified that Charlop acknowledged that the PVC pipe which traversed the manhole was connected to Kuehne's processing equipment—specifically its process line where bleach material was filtered—and that the valve was used to release the liquid water which was part of the filter back-washing process utilized by the company whenever the backwash was required as a result of clogging of filters. In an apparent attempt to explain to Johnson how the process worked, Mr. Charlop noted that by utilizing the underground piping, the filter backwash water could easily be moved through the manhole pipe and down to the discharge pipe right out to the flume. Mr. Johnson then informed Charlop that the connection was illegal and directed him to sever it.
>
> On the following day, January 27, 1981, Mr. Johnson returned to the Kuehne site and noted that the connection had in fact been severed. It was on that date as well that he took some additional photographs of the area, many of which have not been introduced into evidence. [Letter ruling, Administrative Law Judge Reback, August 19, 1986 at 11-12.]

All Mr. Larkin was able to indicate in response to listening to the foregoing, which was read aloud to him during his testimony, was that Mr. Charlop was incorrect in his assertions, assuming that those assertions were in fact made by him.

Much of Mr. Larkin's testimony also directed itself to assertions which sought to lead one to conclude that separate and apart from locating the discharge point, extraneous factors above and beyond Kuehne's control could have or reasonably should have accounted for the high levels of chlorine which were found at flume 5, where the sampling at issue took place. He noted, for example, that in January 1981, the period at issue, LCP had significant leakage in its HCL storage tanks, caustic tanks and building 230 (See R-9). In particular, the leaks that Mr. Larkin described at the HCL storage tanks ultimately spread over the entire concrete pad (also seen on R-9) and, in his judgment, would have drained through the catch basin and ultimately into the flume through the 10-inch wide drain trench which separated the concrete pad area from LCP's lab and locker room facility. He also noted that it was his recollection that in 1980 LCP regularly released chlorine gas into the atmosphere at a rate of three to four times weekly.

Mr. Larkin also testified to his observations on site which occurred subsequent to Kuehne's leaving the area and entirely ceasing its processing operations. He indicated that on or about February 21, 1981 he was on site (with LCP's permission) and observed "significant flow of fluid from the sewer pipe to flume 5." Once he made these observations, Mr. Larkin obtained a bucket, took samples, and telephoned a representative of the Department. He also telephoned the Linden Health Department which, Mr. Larkin noted, provided no assistance. Eventually Mr. Larkin provided the samples to another employee of Kuehne's with the intention that they be analyzed for chemical composition. He noted, however, that either the samples, results of the analysis, or both were lost or misplaced.

The relevance of the foregoing aspect of Mr. Larkin's testimony is apparent. If it could have been established that samples taken at flume 5 subsequent to Kuhene's cessation of its operations at the LCP site had a chlorine and pH level of concentration substantially similar to those found in the samples taken by Mr. Klein as set forth in the Notice giving rise to ths appeal, the discharge might not reasonably be ascribed to Kuehne's processing operations; its origins could lie elsewhere. Since, however, (and unfortunately from Kuehne's perspective) there was never any proofs offered to establish what the chemical composition of that flow was, such inference cannot reasonably and properly be drawn.

Since the fundamental issue concerning the discharge point, which is inextricably tied to the origin of the source of effluent if any, involves a mixed question of fact and law, I shall reserve further discussion for the analytic portion of this opinion where the evidence on this important aspect of the appeal will be reconciled and an ultimate conclusion derived.

Sampling and Analysis

As was previously noted, Harvey Klein, the chief analytical chemist for Garden State was called upon to take the various samplings and perform the analyses at issue. Mr. Klein holds a bachelor of science degree from the Pennsylvania State University and a master of science degree, with a specialization in environmental science, from Rutgers University. Garden State, of which Mr. Klein is vice president, specializes in the chemical analyses of food and environmental materials. Mr. Klein has personally published in the field of microbiology and has received various awards. He is also a

member of the Association of Official Analytical Chemists as well as other organizations and has taught at Rutgers University. Garden State is certified by the State of New Jersey as specializing in environmental and food analyses. Mr. Klein was accepted without objection as an expert in the field of environmental chemistry.

The events which preciptated the sampling conducted by Mr. Klein involve the various visits to the Kuehne site undertaken by Charles Johnson while he was still employed as a senior environmental engineer with the Department. Significant aspects of those visits have already been discussed as part of the factual delineation addressed to the issue of the location of the discharge point. It will be recalled that after his April 1980 visit, Johnson again returned to the site in response to a complaint which was lodged against Kuehne by LCP personnel (see paragraphs 4 and 5 of the Notice) that the former was discharging effluent in contravention of its NPDES permit. On January 8, 1981, after conducting various investigations, Johnson took several samples of water flowing within the flume as well as the effluent emanating directly from the underground pipe.* After taking various samplings at different points in the flume, Johnson prepared a report of his visit (P-6) in which he explicitly concluded that Kuehne was "dumping acid and caustic material." As a consequence Mr. Johnson recommended that immediate enforcement action be undertaken.

It should be reiterated that the Division is not seeking remedial action based upon the allegations set forth at P-6 which were formulated by Mr. Johnson based upon his actions and activities on January 8, 1981. However from the perspective of the Department, it did furnish additional probable cause to undertake follow-up action at the site.

The substance of Mr. Johnson's next visit, which occurred on January 26, 1981, as well as the conversation which was conducted on that date with Scott Charlop and which was the subject of the letter ruling on Mr. Width's motion for partial involuntary

---

*Much of the discussion concerning Mr. Johnson's activities and, to an extent Mr. Klein's sampling, have no visible reference point in this proceeding: the document which was used to refer to those areas where the samplings and observations, both Mr. Johnson's and Mr. Klein's occurred, was offered for identification only and was never introduced into evidence. Consequently the reader may, as did this writer, experience some difficulty in clearly setting forth in narrative fashion, with a reasonable degree of particularity, what took place and where. Whenever possible I will refer to those documents that have been introduced into evidence to refer the reader to particular locations that are relevant this discussion.

dismissal and the Division's cross-motion for partial summary decision, which ruling was issued on August 19, 1986, has already been set forth in detail in this opinion. Also on January 26, 1981 and on the following date, when he returned, Mr. Johnson took the various photographs two of which, P-9I and P-9J, have been introduced into evidence. In addition it was on January 27, 1981 that Mr. Johnson observed and concluded that the valve and pipe depicted on exhibit P-9J had been severed and removed.

It was within the context of these general allegations that Harvey Klein and Garden State were called upon to conduct samplings at the Kuehne/LCP site. The samplings occurred in three phases. The first, comprising two twelve-hour tests, took place between January 14 and January 16, 1981. The second occurred over a twenty-four hour period measured from January 25 through January 26, 1981. The samples were designed to test for pH, total available chlorine, and caustic (what Mr. Klein described as alkalinity). The test for pH was conducted by use of a probe connected to a meter. Sampling of chlorine utilized the iodometric tetration analysis which measures total available chlorine in waste water by the introduction of a potassium iodine solution. The analysis for caustic involves what is generally described as an alkalinity test utilizing an acid-based tetration method.

All of the tests which were conducted were taken directly from Standard Methods for the Examination of Water and Waste Water, 14th Ed. (1975), except the titration used for the detection of alkalinity was modified to include the use of hydrogen peroxide as a consequence of the unexpected bleaching effect of the high levels of chlorine implicated as reagents used in the titration.

Mr. Klein performed all the various analyses at the LCP laboratory on site and used primarily ~~the~~ equipment and materials supplied by LCP for both sampling and analyses. He did, however, bring his own pH probe and his own standards for use in the pH analysis as well as in the alkalinity analysis. For use in the iodometric titration testing, Mr. Klein drew sodium thiosulfate from a sealed carton which was certified by the pharmaceutical company responsible for its production.

Mr. Klein personally observed all the sampling which occurred except for the first 12 hours of the 24-hour tests conducted on January 25 thrugh January 26, the latter of which were observed by another Garden State employee. This was intentionally devised by Garden State so that no one observer would be required to participate in a 24-hour shift.

The samples were drawn by LCP employees in what were described as clean jars and were returned to the laboratory immediately thereafter. Mr. Klein personally performed the various chemical analyses and all samples were in Mr. Klein's sight or possession at all times thus maintaining the chain of custody except on those occasions when the sampling occurred during the first 12 hours of a 24-hour period by another Garden State employee.

Mr. Klein selected three locations in the flume area from which to sample, referred to as flumes 2, 3 and 5. Flume 5 is the key location for purposes of this proceeding in that it is at a point in the covered flume from which the underground outfall piping leading from the catch basin directly flows. Flume 5 has been noted specifically on exhibit R-9, with consent of counsel, by my personal notation of the number "5." It is apparent that whatever was sampled at flume 5 derives from a flow which came from whatever it was that ran through the catch basin (also noted on R-9 by referring to P-9I, the photograph of the catch basin). Flume 2 was located to the east of the flume downstream from the point designated as flume 3. The waters in flumes 2 and 3 were connected with flume 2 being downstream from flume 3. The origin of the flume 5 effluent cannot of course be ascertained merely by determining the composition of the sample.

It should be noted, however, that there is some discrepancy in the results that were taken at flume 5 and those referred to in the Notice at appendix table 1 as the basis for the penalty assessment. The Department erroneously utilized the chemical results of the flume 3 samplings, rather than flume 5 samplings, to assess its penalty as well as to assert the violations at issue. The actual table of results of samplings taken at flume 5 which occurred both on January 25 or 26, 1981 and January 14 through 16, 1981 are properly found on exhibits P-10 and P-11 as results for flume 5.

There is no dispute therefore that the actual sampling which serve as a basis for the allegations and which were obtained at flume 5 should properly be those reflected at flume 5 on exhibits P-10 and P-11 rather than the flume 3 results which are found at appendix table 1 of the Notice (P-1). Accordingly the decision in this matter is based upon the flume 5 samplings and none others.

The actual physical samplings were done by LCP employees under Garden State supervision. In addition, the actual testing took place at LCP's lab rather than a

Garden State's because, as Mr. Klein noted, the close proximity of the sampling site to the LCP laboratory signficantly reduced the likelihood that a time delay would effect the results of the analyses. In addition, the various equipment used in performing the tests was provided by LCP.

Generally the tests taken at each of the flume sites occurred at hourly intervals, each site undergoing three separate tests. Mr. Klein personally conducted the analysis for caustic, pH and chlorine concentrate when he conducted the tests at LCP's lab. The tests were done contemperaneously with the actual sampling. As was indicated, the test results may be found at exhibits P-10 and P-11. In respect to pH levels, Mr. Klein indicated that measurements were taken in standard units, which in most instances connotes a neutral to slightly alkaline reading of from 6 to 9. It is noted, for example, that at flume 5, the test results for pH for January 25 through January 26 in most instances exceeded 10 and, on occasion, 11 units. The numbers, however, may be misleading if one were to conclude that a pH reading of 11 is only marginally higher than what would generally be described as a high neutral reading of 9. Mr. Klein noted, for example, that a pH reading of more than 11 is more than 100 times higher than the limit of a pH reading of 9. It is not in dispute that pursuant to the Kuehne NPDES permit (P-3), pH should not be less than 6.0 nor more than 9.0 standard units.

Also pursuant to the permit, chlorine residual is explicitly limited to .002 mg/1 (parts per million) on a thirty-day average. The findings of chlorine which are set forth at P-10 and P-11 at the various sampling points exceed the chlorine limitations found in the permit by extraordinary amounts. Mr. Klein noted that in most instances they "were millions of times in excess of the permit limitations."

The findings for caustic were somewhat ambiguous. Mr. Klein noted that the sampling for caustic actually measured alkalinity. To test for alkalinity, Mr. Klein utilized the procedure referred to as acidometric titration, which involves the addition of a small amount of acid to the waste water sample until that water sample is neutralized to an end point of pH 8.3, known as the phenolphthalein. The amount of alkalinity originally present can be determined by measuring the amount of acid used in the titration process. In employing this approach, Mr. Klein utilized standards of his own to doublecheck the LCP materials. The test merely measures the amount of alkaline materials in the waste water sample and typically alkalinity is reported as one form only, in this matter sodium hydroxide, which is commonly known as caustic.

The alkalinity finding demonstrated by the titration method cannot directly correlate to pH levels as derived in any sample; rather it serves a corroborative function since pH as derived in a sample reflects a combination of the effects of acid and alkaline materials on each other in an apparent synergistic fashion. This finding related to pH levels but only indirectly.

Also in his testimony, apparently anticipating an assertion that the source of the materials sampled was other than Kuehne's processing operations, Mr. Klein observed nothing on or near the ground by way of leakage which could have explained the chlorine readings which he derived. He also concluded that the levels of chlorine which were found could not, in his judgment, have been present if their source was, as Kuehne has represented throughout, non-contact cooling water.

As is apparent from the Garden State sampling results (P-10 and P-11) and from particular reference to flume 5, which forms the fundamental basis under which the Notice and penalty assessment are issued, for January 15 and 16, 1981, the pH levels derived at flume 5 are either at or just above the highest allowable pH levels set forth in Kuehne's permit—a maximum pH of 9. The chlorine levels sampled for that same date at flume 5 are reported in grams per liter as a consequence of the quantities of chlorin found rather than the milligram per-liter standard set forth in the permit. Thus, as Mr. Klein indicated, all of the results found are thousands of times in excess of the maximum milligram-per-liter chlorine levels set forth in the permit and can only be correlated to the permit limitations after multiplying the result by 1000.

The test results for the period January 25 and 26, 1981 were even higher than those which were found on January 15 and 16 in respect to all permit parameters (see P-11). For example, the pH levels at flume 5 for every sample taken exceeded the maximum permit limitation of 9 units. Since the pH scale is logorithmic, a value of 10 is ten times as great as a value of nine and a pH value of 11 is more than one hundred times greater a value of 9.

The sampling of chlorine for the January 25-26 dates also indicates that the levels discovered were thousands of times in excess of the permit limitations (after converting the sampling into milligram units per liter). As Ms. Hayes notes at her brief, "The highest reading is over 32 million times the permit limitation." Letter brief, DAG Hayes, January 28, 1987 at 25. To this layman the sampling result is astoundingly high.

In respect to alkalinity, levels discovered on January 25 and January 26 were much higher than on January 15 and 16, reflecting the highly alkaline nature of the effluent from flume 5.

It should be noted that throughout the very aggressive cross-examination conducted by Mr. Width, Mr. Klein was unflagging in his assertions and in his defense of the methodology and procedures employed by Garden State in the sampling that was undertaken.

One avenue which was utilized by Kuehne to attack the validity of the sampling methodology employed by Mr. Klein was through reference to a Field Procedures Manual for Water Data Acquisition, promulgated by the Division (R-4). By its own prefatory language, the manual limits itself to the methods and procedures to be utilized by "all state and substate agencies . . . and by all organizations collecting data pursuant to state or federal statutes and regulations." P-4, III. Whether Garden State did or did not come within these parameters was never fully developed at hearing. In my judgment, however, whether it did or did not is non-determinative. It clearly did have the obligation to conduct its analyses in an empirically responsible fashion. In my judgment it did.

Counsel refers to the obligation contained in the manual (R-4) at I-3, paragraph 6, which requires a sampler to maintain a bound daily log book. While it is true that no indication was given as to whether Mr. Klein maintained a bound daily log book, the record does establish that he conducted proper and responsible recordkeeping. Exhibits R-10 and R-11, the reports at issue, contain specific information in respect to the date, time, and location of the sampling as well as other information pertaining to the environment. The tests which were conducted for pH and chlorine, noted Mr. Klein, are relatively simple and involve a relatively small error of coefficient. While certainly one could speculate that by conducting the tests at LCP's own labs, if LCP had a motive to distort those results it could have done so. However, I have accepted the integrity of Mr. Klein throughout these proceedings. There has been nothing to indicate a reason not to, and he represented under oath that he was individually and personally accountable for the conduct of all the chemical analyses and sampling which took place at LCP.

While one would always prefer that chemical analyses take place in the more pristine laboratories of the testing facility itself, because of the proximity of LCP's labs to the sampling site and the obvious advantage to the chemist of conducting the analysis

contemporaneously with the samples taken, the reasons in support of the procedures employed outweighed any arguments against them. In addition nothing in my judgment has been offered to suggest or imply that errors occurred in the analyses because of where they took place.

Kuehne also sought to question the validity and empirical findings of Garden State's activities through the testimony of Dr. Edwin Rothstein, a chemist with a distinguished background, who was qualified as an expert both in chemistry generally and analytical chemistry specifically. By his own acknowledgement, however, Dr. Rothstein has no prior significant on-hands involvement in waste water analysis. Thus he was not qualified as an expert in environmental chemistry since most of his experience was in the areas of graphic arts and related fields. By his own acknowledgment Dr. Rothstein did not perform analyses of field samples for the laboratory with which he is affiliated, Leberco, as part of his normal responsibilities. Parenthetically, as well, Leberco is not certified by the Department.

One major thrust of Dr. Rothstein's effort on behalf of Kuehne to attempt to cast doubt on the validity of Mr. Klein's findings concerns his opinion about the pH value and caustic findings which were obtained. The suggestion initially was made by Dr. Rothstein that the two findings could not empirically co-exist as they were ascertained. However, as the testimony was thereafter developed, in my judgment, that conclusion resulted more from a misunderstanding of what is meant by caustic than by the actual test results themselves. It will be recalled that the results of caustic sampling represented simple alkalinity reported as sodium hydroxide or caustic but not sodium hydroxide per se. Based upon this clarification, Dr. Rothstein's assertions of incompatibility of the findings were reconsidered and he did acknowledge that the findings derived by Mr. Klein were possible providing that the alkalinity was not indeed sodium hydroxide as the former first assumed.

Dr. Rothstein's concern in respect to Garden State's activities also involved his suggestion that the latter failed to employ good industry practice in conducting the analyses. Particularly, he asserted, there was no validation of standards which were used and presumably obtained by Garden State from LCP. The standard, the chemical solution which is used to determine the existence or nonexistence of chemicals which are being tested, in this case chlorine, pH level, and caustic, were in fact obtained by Mr. Klein from LCP. However, Mr. Rothstein was compelled to acknowledge that the standard

employed are purchased in sealed containers and are certified. I was satisfied from the evidence adduced that the procedures as well as the standards utilized by Mr. Klein, notwithstanding the testimony of Dr. Rothstein, conformed to good professional practice and as a consequence the results obtained by Mr. Klein reasonably and accurately reflected the chemical composition of the substances sampled.

In addition to questioning the validity and reliabilty of the chemical analyses of the samples, and in addition to disputing the location of the discharge point which must reasonably correlate to the flume locations at which the samples were taken, Kuehne also sought to suggest that the presence of high levels of chlorine and pH at the sample points could be ascribable to activities separate and distinct from its own processes and could properly be imputed to LCP's facilities and processes. Some of these suggestions have already been analyzed as an incident to the discussion of Mr. Larkin's testimony. Some further reference and reiteration is appropriate.

Mr. Klein provided some additional rebuttal to his testimony which reasonably and satisfactorily explained away the suggestion that the presence of high levels of chlorine and pH could be attributable to those aspects of LCP's facilities to which Mr. Larkin's testimony was addressed. For example, it will be recalled that Mr. Larkin indicated that as a consequence of the purported leakage at LCP's HCL storage tanks (see exhibit R-9) there would have been significant levels of HCL proceeding through the ten-foot concrete trench which would ultimately lead to the catch basin. Mr. Klein indicated that on his initial visit, he specifically observed this trench and he unequivocally testified that it was not conducting any significant amounts of HCL. He confirmed this as well in his recollection of his second visit and reinforced these conclusions by unequivocally asserting that had there then been high levels of HCL, as a chemist he would be familiar with this acid ~~and~~ would easily have detected it through his olfactory sense.

Again on January 25, 1981 when he returned, Mr. Klein confirmed his earlier observations. He reinforced these determinations by expressing the view that even if arguendo there had been high levels of HCL which proceeded through the ten-foot trench into the catch basin and ultimately through to flume 5, the concomitant pH readings at that point would have been significantly lower than what the chemical analysis proved them to be.

Mr. Klein also countered the suggestion made by Mr. Larkin that the presence of high levels of chlorine residual and pH found at flume 5 could be ascribable to LCP drainage from its laboratory and locker room facilities. Mr. Klein spent several hours at LCP's lab as well as at flume 5. He noted that on occasion the smell of chlorine at flume 5 was potent. Mr. Klein indicated that in order to causally connect the findings made at flume 5 to LCP drainage in its laboratory, substantially greater volumes of substances in the lab would have been required to be drained than actually could have existed there. Significantly large volumes of bleach, he noted, would have had to be drained to account for those readings.

Mr. Larkin also referred to a lime treatment facility which was within the general LCP site and sought to ascribe the pH levels and chlorine residual readings to that facility rather than to Kuehne's process facilities. Mr. Klein was unambiguous in countering this suggestion: the applicable readings that were taken by Garden State and which served as a basis for the Division's issuance of the Notice simply could not be ascribed to that facility.

It will also be recalled that in his testimony, Mr. Larkin addressed the high readings of chlorine residual which Kuehne reported on its own initiative when it submitted its first monitoring report to the EPA (P-4). While this report relates to a period of time which predated by several months the violations giving rise to the Notice, it is material because it reasonably establishes that by Kuehne's own sampling it was exceeding its permit limitations. In his testimony Mr. Larkin sought to explain away any causal connection between Kuehne's process facility and those readings. He hypothecated that through various chemical reactions the presence of that level of chlorine could have resulted from occurrences taking place at LCP's cooling tanks.

Mr. Klein adamantly disputed this hypothesis, noting that the result of such potential chemical reaction would have been to produce HCL which would have reduced rather than increased the level of pH. In fact, the pH value sampled was 8.1. I am compelled to accept these assertions offered by Mr. Klein. Mr. Larkin's views were substantially based upon hypothecation and speculation. In addition Mr. Larkin's expertise was limited exclusively to the processing of bleach; by his own admission, he is not a chemist and where differences emerged between Mr. Larkin's speculation and Mr. Klein's well-grounded theoretical conclusions and empirical findings, the judgments derived by the latter must be adopted.

Providing corrobative testimony to the Division's case in respect to various areas of dispute was John Tomasiello. Mr. Tomasiello is employed in an enforcement capacity in what was described as the Southern Region within the Division of Water Resources. He accompanied Charles Johnson to the LCP site on several occasions.

Mr. Tomasiello noted in his testimony that during his visit on January 26, 1981, the date of the conversation which took place between Scott Charlop and Charles Johnson, he observed no flow whatever in the ten-inch drainage trench which separates the concrete pad area and the LCP lab and locker rooms as depicted on R-9. This would confirm the Department's position and would further vitiate the assertions of Mr. Larkin that hypothecated that the purported leakage from LCP's HCL storage tanks could have caused the chlorine residuum buildup at flume 5.

Mr. Tomasiello also independently confirmed the substance of the important conversation previously set forth betwen Charles Johnson and Scott Charlop in which the former significantly acknowledged that the processing pipe and valve which are depicted on P-9J were indeed utilized by Kuehne as part of its filter backwash system.

Mr. Tomasiello visited the site again in February 1981, subsequent to the cessation of Kuehne's operations. He testified that he responded to a Department communication which suggested that discharge in the area was continuing. As will be recalled, both Mr. Larkin and Mr. Goetzel noted that effluent at flume 5 continued even after Kuehne ceased its operations, suggesting the possibility that the effluent flowing from that spot could be ascribable to operations other than Kuehne's. Mr. Tomasiello testified that he saw no discharge at flume 5 (referring to R-9) although he did observe ground water in the area.

Charles Maack, currently Assistant Chief of Region II and Charles Johnson's supervisor when the latter was employed by petitioner, provided support in respect to how the Division computed the $17,500 monetary penalty assessment imposed in the Notice. He acknowledged that the computations should have been based upon the measurements taken at flume 5 as found on P-10 and P-11 rather than those contained at appendix table 1 of the Notice which inadvertently refers to the readings taken at flume 3. He, as well as other Division representatives, agrees that the penalty assessment should have been based primarily upon the readings at flume 5. Notwithstanding this acknowledgment and the recognition that the flume 5 readings for pH levels were lower than the readings at

appendix table 1 and the caustics as well as the chlorine readings were generally lower, he maintained that the penalty assessment should not be reduced. Mr. Maack concluded that in retrospect and based upon the evidence as was adduced, the Division maintains today as it did when the Notice was initially issued that the conduct of Kuehne in respect to the alleged violations contained in the Notice were "willful" and thus the formula resulting in the $17,500 penalty was justified.

The penalty assessment process, which was utilized at the time that the Notice was issued, was based upon explicit regulatory criteria then in effect which have since been amended. Thus the penalty aspect of this appeal will be more fully addressed in the analytical portion of this opinion.

ANALYSIS

The Discharge Point

As will be recalled, the threshhold issue in this matter, which initially was addressed by motion, concerns ascertaining the appropriate location of the discharge point that is the subject of Kuehne's NPDES permit. After the Department rested its case on that issue and both parties had the opportunity to submit legal argument, it was my judgment that the Department was correct in concluding that the discharge point was appropriately designated to be below the manhole found on Kuehne's discharge stream (referring to R-9) where the concrete pipe entered the flume. Kuehne has throughout this proceeding—pre and post motion—asserted that, to the contrary, the appropriate discharge point was located in its process area where its cooling tower water bleed entered a stand pipe (See R-9).

After all the evidence and testimony in this matter on the issue has been adduced and the record is whole, it remains my judgment that the Division's assertion concerning the location of the discharge point is correct. The discharge point is generally recognized to be the location at which an appropriate representative sample of the volume of effluent flow as well as the quantity of pollutants discharged may be measured and sampled (See P-3 at 2). Harvey Klein drew samples from several areas at the site, most notably flume 5 (referring to R-9), which indicated that large quantities of chlorine was emitted into the flume and eventually found its way into a tributary of the Arthur Kill, waters of the State of New Jersey; in some instances the amounts of chlorine exceeded Kuehne's permit limitation by the millions. The testing at issue took place over

a protracted period of time. Thus one must reasonably and intelligently infer that the levels of chlorine found was clearly within toxic limits and the concomitant pH levels were indeed representative of the effluent which was ultimately dumped into the flume at point 5. Because of the protracted period of time at issue, the samples taken must be considered to be representative both of the volume of effluent flow and the quantity of the pollutants discharged.

The discharge that was taking place was not a one-time occurrence. Garden State sampling continued over many days and, in addition, judging by Kuehne's own sampling which occurred as part of its monitoring report (P-4), governing the period August 31, 1980 through and inclusive of December 1, 1980, the respondent itself was constrained to report finding exceedingly high levels of chlorine. While Kuehne admittedly could not account for these readings and indicated in its report that it would "investigate cause," no evidence or testimony was ever offered on behalf of the respondent to demonstrate that any good faith effort was undertaken to ascertain the reasons for those high levels. What has become apparent therefore, is that noxious and toxic substances with levels of chlorine and pH far beyond the paramaters of Kuehne's NPDES permit, dangerous to both animal and plant life, were part of the effluent discharge at point 5 of the flume.

The question then becomes one of ascertaining the origin of this effluent. Reasonably there are several alternatives: LCP could have been responsible for these high levels of effluent. There was evidence to establish that drainage from LCP labs and locker room facility ultimately found its way through the concrete pipe past through the catch basin and ultimately settled in the flume. There were also indications of sporadic leakage at LCP's HCL storage tanks. It was clear to me, however, that the high levels of chlorine and pH discovered could not reasonably be ascribable to any activities in LCP labs or locker rooms. Presumably the locker room facility was used by employees to shower and wash and no explanation was forthcoming to conclude that activities within that facility could cause the high levels found. It would be unreasonable to infer that anything that occurred in the LCP lab would result in the high concentrations of effluent sampled so as to justify holding LCP responsible for the occurrence, absent affirmative proof to the contrary. In addition, there was simply no evidence to establish through direct observation that LCP's HCL storage tanks were leaking at the time that the samples were taken so as to justify a conclusion that they were the source of the effluent. These findings were confirmed by the observations, opinions and testimony of Harvey Klein.

The more reasonable conclusion which one is constrained to draw from the record is that by the nature of the processes at issue, the location of the catch basin and piping, the nature of Kuehne's processing activity, and, indeed, by the very essence of a former employee's own admission, the materials which ultimately found their way through to flume 5 and which were the subject of the samples had their origin in Kuehne's processing facilities.

To an extent this conclusion must be arrived at by a process of elimination. Absent any contrary affirmative evidence which would legitimately and reasonably establish through competent proof that the origin of this effluent was LCP's, the undisputed fact remains that dumping occurred. Who else then could reasonably be held accountable for that dumping if not the very company whose activities in the processing of bleach occurred in the midst of where these pipes lay? The inference is irresistible that by the nature of the instrumentalities involved and by the possession and control of these instrumentalities by Kuehne, albeit on LCP's property, respondent must be held accountable for what was flowing through to flume 5.

Mr. Johnson's visit to the site on January 26, 1981 provided cogent evidence to confirm the location of the discharge point as delineated by the Division. It will be recalled that Johnson made a determination that the underground piping which connected to a PVC valve and which connected to overhead pipes (See p-9J) emanated from Kuhene's processing equipment and it was through these connections that the effluent flowed. Johnson's subsequent conversation with Scott Charlop, the then manufacturing manager for Kuehne, provided further corroboration of the location of the discharge point. It will be recalled that there was a finding made in this proceeding that Charlop told Johnson at that time that the PVC pipe which traversed the manhole cover did indeed connect to Kuehne's process equipment—specifically its processing line where bleach material is filtered—and that the valve was used to release the liquid which was part of the filter backwashing process utilized by Kuehne whenever the backwash was required to purge the system as a result of the clogging of filters. While Mr. Larkin disputes the accuracy of Charlop's statements he cannot dispute that Charlop at the time that the statement was made was an employee of Kuehne's who was both in fact and appearance clothed with authority in his capacity as manufacturing manager to make those representations. They are in my judgment sufficient to be imputed to Kuehne. It will also be recalled that Mr. Tomasiello confirmed the substance of this conversation in his testimony when he recalled that he was present with Johnson on site at the time that Charlop's statemer were made.

Further, Mr. Larkin by his own admission indicated that on previous occasions employees, apparently without express authority, did indeed use the process line to unauthorizedly release effluents. By Kuehne tacitly abiding this action it impliedly authorized it. It will also be recalled that Mr. Larkin acknowledged that in or about 1979 as part of an empirical testing pilot program, the valve at issue was also used as an incident to the filter backwashing process to release and expel effluents. Thus while Kuehne has maintained throughout that it did not in fact dump at the site, it possessed the capacity and instrumentality to do it; the effluent which was dumped was chemically consistent with the release of filter backwashing waters; and employees had indeed utilized the piping and valves, albeit without express Kuehne authority but with implied and apparent authority, to do precisely that on occasion.

In my judgment, few if any additional substantive arguments were offered by Kuehne subsequent to the testimonial phase of this proceeding other than those which have already been discussed in detail as they relate to ascertaining the appropriate location of the discharge point. Several of those remaining arguments should, however, be addressed.

Mr. Width asserts that the point of discharge set forth by the Department is so uncertain as to render it the subject of a successful motion to dismiss the Notice. He analogizes ascertaining the discharge point as the Division asserts it to be with alleging that KCC "discharged from a truck on a road in Canada in violation of its permit. . . . One must discharge from a certain place which is controlled by or related to, the permit." Respondent's posthearing brief, January 28, 1987 at 6. Respectfully, this analogy is misplaced. Equating the discharge point—as it has been established in this proceeding, by definitively and specifically correlating it as the locus of the relevant physical facilities at issue—with a "moving" discharge point such as a truck travelling down a road is unreasonable.

Mr. Width also argues that the discharge point is where Kuehne represents it to be because at one time it appeared that both Kuehne and the Department "had a common understanding of where the discharge point was located and that discharge point was properly located in accordance with the procedures outlined by Mr. Post." Id. at 8. The flaw in this argument is of course that the location initially designated as a discharge point upon which Department representatives had initially agreed was based exclusively upon where they were told that it was by Kuehne representatives. Once, however, further

investigation ensued and on-site investigations occurred, the Division disagreed with Kuehne's designation: no "common understanding" existed thereafter.

Finally, Mr. Width suggests that because Kuehne was a lessee of LCP's and therefore not the owner in fee simple of the situs, the discharge point as ascertained by the Department is erroneous since "it is legally impossible for this to be [the discharge point] because this point was not owned or controlled by [Kuehne]. How could [Kuehne] obtain a permit for a discharge point which it did not own or control?" Id. at 9. No authority was offered by counsel to establish or even suggest that a prerequisite to ascertaining the appropriate discharge point is that the discharging entity own in fee simple or otherwise the realty on which such point is to be designated. The hallmark of properly ascertaining the discharge point is to determine the location at which all waste streams are qualitatively and quantitatively represented in a sample. That such location is on property belonging to another is singularly immaterial.

Under the standard of proof adhering in this administrative proceeding, in which the party must establish its case by a preponderance of the relevant credible evidence, I am convinced that viewing the record in its totality and qualitatively accessing the evidence, the Division has indeed established that the discharge point is where it has alleged it to be.

I am sympathetic to the arguments offered by Mr. Larkin and Mr. Goetzel. Both gentlemen impressed me as credible witnesses and men of integrity. Both men passionately argue that to the best of their knowledge, Kuehne was not discharging pollutants in the manner alleged. Mr. Goetzel particularly expressed the view that responsibility for the effluent lies at LCP's door. It was clear that there was considerable animus generated over many years between representatives of each of these companies. Perhaps indeed LCP had a motive to cause Kuehne to be the subject of this proceeding as well as others. Conceivably LCP's action did contribute toward the effluent. However, the fact finding process must limit itself exclusively to the record as generated. Facts cannot be arrived at as a consequence of speculation or mere suspicion. I must accept the record as established in this matter and I expressly CONCLUDE that the discharge point at issue is as represented by the Division: at a point below the manhole downstream from where the concrete and PVC pipes as depicted on P-9I and P-9J enter the flume at point 5 (see R-9, P-12E, key 2, 3, and 4).

I am further compelled to CONCLUDE that the various chemical analyses which were conducted by Garden State Laboratories at flume 5 (having already concluded that the results of those samplings accurately reflected sound laboratory procedure) revealed discharged chlorine, pH, and caustic levels directly ascribable to Kuehne's processing equipment.

Mr. Width is correct when he notes at the conclusion of his brief that these proceedings "have left many questions unanswered" Respondent's brief at 25. There are disturbing gaps in the proofs. There is no "smoking gun." There were areas of ascertaining the discharge point based particularly upon Mr. Larkin's testimony that on supposition could reasonably explain away the Division's position. Aspects of Dr. Rothstein's testimony did raise questions concerning the testing procedures utilized and the meaning of the results, particularly in respect to caustic. However based upon a cumulative, qualitative appraisal of the record in this matter—a matter which apparently has been pending for some five years, the Division has proven its case. When in the foreground one recognizes that the physical site at which the various actions took place no longer exists; that it was only upon my prompting that physical representations of the site were provided by the Division in support of its case; that witnesses tend to forget; that certain witnesses are no longer employed by either party in this case, under all the circumstances and inspite of all the difficulties presented in establishing a record, the analysis and conclusions derived represent what in my judgment is a reasoned and fair record of the operative elements and supports the Division's position.

The Violations

Pursuant to N.J.S.A. 58:10A-6 of the Act, it is unlawful for any person or corporation to discharge any pollutant except in conformance with either a valid NJPDES permit issued by the Commissioner of the Department of Environmental Protection pursuant to statute, or pursuant to a valid NPDES permit issued by the appropriate administrative authority under the federal act, 33 U.S.C.A. section 1251 et seq.

In the current matter respondent, Kuehne, was issued an NPDES permit under appropriate federal statute (NPDES permit no. NJ0027707) on or about July 14, 1980. The permit, pursuant to Kuehne's own application request, was for the discharge of uncontaminated cooling waters from Kuehne's Linden plant (P-3). It expressly limits the

pH of any effluent discharged to be not less than 6.0 nor more than 9.0 standard units. It also expressly limits chlorine residual effluent to .002 mg/1 on a 30-day average.

Pursuant to paragraph 6 of the Notice, Kuehne is charged with violating its permit limitations on January 15 and 16, 1981 by discharging effluents with: (1) pH levels which exceeded its NPDES permit limitation; (2) extremely high concentrations of caustic; and, (3) by exceeding, to a significant degree, the chlorine residual maximum as well. Having already arrived at a factual determination in respect to these assertions, it is axiomatic that the allegations set forth at paragraph 6 of the Notice have been established by the proofs generated. Accordingly I expressly CONCLUDE that the allegations set forth in the Notice at paragraph 6 concerning the activities of Kuehne at its LCP site on January 15 and 16, 1981 have been established and accordingly Kuehne has exceeded the pH and chlorine level sets forth in its permit, discharged high concentrations of caustic, and concomitantly contravened N.J.S.A. 58:10A-6.

The allegations set forth at paragraph 7 of the Notice, which relate to the activities of Kuehne on January 25 and 26, 1981 have, for the same reasons as previously set forth, also been established. The discharge of pH and free chlorine in excess of limitations contained in the NPDES permit issued to Kuehne and the discharge of high concentrations of caustic is also by necessity a contravention of N.J.S.A. 58:10A-1 et seq., as alleged at paragraph 11 of the Notice.

The Penalty Assessment

As will be recalled the Division has assessed a penalty against Kuehne in the amount of $17,500. The formulae employed in arriving at this amount and the discretionary as well as non-discretionary authority exercised by the Division in support of its determination is set forth as part of the Notice in an attachment referred to as "rationale for fine amounts." Testimony was also elicited to support this assessment through Charles Maack, who was Charles Johnson's supervisor in 1981, and the assistant chief of Region II.

The bases of the penalty assessment in this matter were regulatory criteria which were set forth at N.J.A.C. 7:14-8.1 et seq. during the time period at issue. Those regulations have since been amended. See 16 N.J.R. 181. There is no dispute between the parties, however, that the former regulations found at N.J.A.C. 7:14-8.1 et seq. wer

applicable in determining the issue of whether the penalty assessment set forth is appropriate. It should also be noted as an aside that in respect to the central issue of penalty as it is related to this matter, the major difference between the regulations that existed at the time in question and those which have subsequently been enacted is that the values of seriousness of the environmental damage in the schedule of factor values for discharge violations have significantly increased. This was designed to provide greater emphasis to environmental impacts of the discharges and also to offset the effect of inflation. See 16 N.J.R. 82.

In respect to applying the formulae and procedures set forth at the regulations, it is without dispute that in measuring and determining the extent of effluent, the Division relied primarily if not exclusively upon the analyses which were conducted at flume 5. It will be recalled that earlier in this opinion it was indicated that the appendix to the "rationale for fine amount" inadvertently set forth measurements which do not reflect the flume 5 samplings but those taken at another site. Accordingly reference throughout this discussion will relate to what actually was sampled at flume 5. See P-11 at 2.

In assessing penalty, the Division has charged Kuehne with four discharge violations. On January 15 and 16, 1981, and again on January 25 and 26, 1981, respondent is charged with exceeding limits set forth in its NPDES permit by discharging an effluent containing high pH into a tributary of the Arthur Kill as well as discharging pollutants which are not listed in its NPDES permit application into the same tributary—high concentrations of free chlorine and caustics.

In respect to each of these violations, the previous analysis and discussion has already factually established the underlying violations. The extent, however, of the penalty assessment is dependent upon the application of the various regulatory criteria set forth which measure the seriousness of the penalty, its willfulness, and the type of violation established. Each of the criteria is then given a factor value which is utilized in computing the monetary basis of the penalty itself.

In respect to the seriousness of the discharge of effluent containing high pH, the Division has determined that the damage caused is "slight." In respect to the discharge of the quantities of caustics and free chlorine the Division determined that the damage likely to be caused to the environment is "moderate." It is my judgment that in

respect to the factors ascribed to the seriousness of these four incidents of discharge violations, the Division acted properly in arriving at the values attributed. Particularly in respect to the amounts of chlorine found, it will be recalled that Mr. Klein made it apparent that the amounts in question were on occasion hundreds of thousands if not millions of times in excess of those levels deemed to be safe.

In respect to the type of violation at issue concerning the discharges occurring on the dates at issue, the Division has determined that they constitute what the regulations described as "willful" discharges. Pursuant to N.J.A.C. 7:14-8.10(c)(1), a violation shall be considered willful if it is "one which is the result of some deliberate, knowing or purposeful action or inaction by the violator." In my judgment the facts in this matter have not demonstrated that the discharges which have been found to have occurred on the dates at issue were willful violations resulting from Kuehne deliberately, knowingly, or purposefully engaging in chemical dumping.

Kuehne has been in business for some 60 years. I was impressed with the forthrightness and integrity of Messrs. Larkin and Goetzel. Mr. Larkin's candor in acknowledging under oath that in the late 1970's Kuehne did some experimentation which resulted in unauthorized effluent and candidly acknowledging as well that without express prior authorization Kuehne employees engaged in similar although episodic acts in the past further establishes his credibility as well as the credibility of the company. No evidence was offered to suggest or establish that Kuehne has ever been guilty of any other violations in the past, which is relevant to establishing a state of mind or a mind set of its high officials, eroding even further the suggestion that the violations at issue were willful. Furthermore, both Mr. Goetzel and Mr. Larkin impressed me as intelligent, articulate men: they are no fools. For them to have engaged in a willful course of action resulting in dumping after by their own admission they had reported excessive amounts of chlorine found when Kuehne first submitted its monitoring report to the EPA (P-4) would be inconsistent with intelligent minds. I believe that to this day Mr. Goetzel and Mr. Larkin honestly believe that Kuehne is not responsible for the effluent found.

A willful violation presuumes a mens rea or state of mind that manifests a conscious, deliberate, intention to commit a wrongful act. No such state of mind has been found here; none can inferentially be ascertained based upon the facts generated. While applicable regulations do set forth a presumption that a violation is deemed to be willful "if the violator attempts to destroy or conceal evidence thereof, or deliberately supplie

the Department with false or misleading information concerning the conditions which constitute the violation," in this case the presumption is exculpatory rather than inculpatory of the standard that must be established to support the Division's penalty. For as was just noted, rather than conceal information, Kuehne honestly, candidly, and voluntarily provided the EPA with a monitoring report (P-4) which explicitly set forth the excessive chlorine findings. This report was based upon an analysis conducted on December 17, 1980, only weeks prior to when the violations themselves occurred.

The discharge violations at issue are more properly typed as "untentional but foreseeable." This type of violation is defined at N.J.A.C. 7:14-8.10(c)(3) as one which the violator, by the exercise of reasonable diligence, could and should have foreseen and prevented. Because Kuehne was on notice in December 1980 of excessive chlorine residual found and because no evidence was adduced to indicate any action which it took from then to when the violations were charged to ascertain the cause of the effluent or to take anv action to remediate the problem, the value to be ascribed to such unintentional but foreseeable discharge should be found in the high range. Subsection (e) of the foregoing regulation places the value from .75 to .50. In my judgment therefore the factor based upon this type of violation for each of the four discharge violations at issue shall be reduced from 1.0, representing a willful violation, to .75. Thus, the penalty formula for each of these four violations shall be as follows:

Violation: Exceeding effluent limits of NPDES permit on January 15-16, 1981--high PH levels

Seriousness factor 0.5
Type factor .75
Penalty formula - $5,000 x .5 x .75 = $1,875

Violation: Exceeding effluent limits of NPDES permit on January 25-26, 1981--high pH levels

Penalty formula - $5,000 x 0.5 x .75 = $1,875

Violation: Discharging pollutants not listed in Kuehne's NPDES permit application on January 15-16, 1981--high quantities of chlorine and caustics

Penalty formula - $5,000 x .75 x .75 = $2,812.50

In his posthearing submission, Mr. Width argues that contrary to the violation for which the foregoing penalty gives rise, "chlorine was not an unlisted pollutant (Exhibit P-3, page 17), only caustic was unlisted." Respondent's posthearing brief, at 22. I disagree with Mr. Width's characterization. While it is true that the permit sets forth a limitation of chlorine at .002 mg/l on a 30 day average, this limitation was for chlorine residual. As the term implies, the permit was directed with the view towards the discharge of noncontact cooling water. The basis of the permit was Kuehne's own application in which it explicitly sought a permit for cooling water as the only discharge. Thus, in my judgment, while the permit allowed only a minimal residual amount of chlorine, which must have been foreseen as a potential concomitant of cooling water, the enormous amounts of chlorine found in the sampling was neither in spirit nor intent, a pollutant which was listed in the NPDES permit at issue or its application. Indeed as will be recalled, at question 14 of the permit application (P-2) Kuehne affirmatively indicates "no" in response to the question of whether its discharge either contains or is possible to contain various substances—including chlorine. Thus the violation as framed is proper.

Violation: Discharging pollutants not listed in Kuehne's NPDES permit application on January 25-26, 1981—high levels of chlorine and caustics

Penalty formula - $5,000 x 0.75 x 0.75 = $2,812.50

The final penalty assessment is directed to what is described by the Division as a "nondischarge" violation. The Division alleges that Kuehne submitted false information on its NPDES permit application by stating that the discharge would be for cooling water only. The rationale for the amount which the Division provided as an incident to its Notice does not apply any formula; instead it imposes what it describes as a "basic penalty" of $5,000. Similarly, reference to the regulations that were applicable at the time at issue does not reveal a procedure to compute a basic nondischarge violation penalty. Rather, at N.J.A.C. 7:14-8.11, the Commissioner of the Department is given the option of assessing a penalty for a single offense as a nondischarge violation.

Apparently that is what was done in the current matter. A reading of the regulatory scheme then in effect reasonably leads to the conclusion that the Commissioner of the Department may assess a penalty of not more than $5,000 for any violation whether it be a discharge or nondischarge violation. See N.J.A.C. 7:14-8.1. It is noted therefore that the basic penalty of $5,000 is the maximum authorized for a single violation.

In the current appeal the factual findings that have been generated and the analysis establish that the effluent attributed to Kuehne far exceeded that which is traditionally associated with noncontact cooling water. Thus it is clear that the information which was provided by Kuehne on its application for an NPDES permit was erroneous. The difficulty, however, in assessing a $5,000 penalty is that since it is the maximum basic penalty allowable, one must assume that the Division has concluded that the information which was erroneously submitted by Kuehne was also intentionally false in nature. For the same reasons that I have determined that the discharge violations are nonwillful, I also conclude that the nondischarge violation was not proven by the Division to be willful.

I am convinced that Messrs. Goetzel, Larkin, or any other high official of Kuehne did not malevolently scheme to apply for an NPDES permit, knowing in advance that it was going to obtain it for non-contact cooling water only, when it was about to deliberately and intentionally dump high and dangerous levels of chlorine into the waters of New Jersey. What was actually in their hearts when they proceeded to obtain the permit can of course only be known by them. From the evidence, however, and from the testimony generated, I am satisfied that these men and the company that they represent were not culpable of such gross misconduct.

As will be recalled, it was my opinion that in respect to the discharge violations, the type that should be ascribed to Kuehne's actions was in the high value range of an unintentional but foreseable violation. These, however, were violations which occurred subsequent to Kuehne, by its own findings, discovering high levels of chlorine that were being emitted. Thus in December 1980 Kuehne did or reasonably should have known that a problem persisted and it should have taken action to remedy it.

In respect, however, to the application process, the gravamen of this nondischarge violation, there was no evidence before me which would indicate that at the

time that Kuehne applied for its NPDES permit, it had any reason to conclude, expect, or foresee by the exercise of reasonable diligence that it was engaging in a process which would result in dumping effluent containing high levels of chlorine, caustic, or pH levels into a tributary of the Arthur Kill.

For it must not be forgotten that Kuehne made application for its NPDES permit in 1974. It was not until six years elapsed from that date that the NPDES permit was issued. Thus, to convincingly suggest that in 1974 falsification, intentionally designed by Kuehne, existed, dilutes even further the state of mind which is deemed necessary to arrive at such a finding. The evidence could at best establish that the problem was discovered only when Kuehne submitted its first monitoring report, which occurred at least 6 months after its permit was issued and 6 and 1/2 years after its 1974 application.

Accordingly in respect to the nondischarge violation, I **CONCLUDE** that while the information provided on the NPDES permit application by Kuehne was incorrect, the Division did not establish that it was intentionally false. Accordingly in respect to this final, nondischarge violation, no penalty should be assessed. Accordingly the total penalty shall be assessed as follows: 2 x $2,812.50 plus 2 x $1,875 = $9,375.00.

Accordingly and based upon the foregoing, it is **ORDERED** that the allegations set forth by the Division in the Notice and delineated at paragraphs 6, 7 and 11 are sustained. It is further **ORDERED**, however, that the civil administrative penalty assessed against Kuehne as a consequence of the foregoing violations be modified and that the respondent pay and be assessed a fine in the amount of $9,375.00 for the violations found to have been committed.

This recommended decision may be affirmed, modified or rejected by the **COMMISSIONER OF THE DEPARTMENT OF ENVIRONMENTAL PROTECTION, RICHARD T. DEWLING**, who by law is empowered to make a final decision in this matter. However, if Richard T. Dewling does not so act in forty-five (45) days and unless such time limit is otherwise extended, this recommended decision shall become a final decision in accordance with N.J.S.A. 52:14B-10.

I hereby **FILE** my Initial Decision with **RICHARD T. DEWLING** for consideration.

March 10, 1987
DATE

STEVEN C. REBACK, ALJ

Receipt Acknowledged:

March 13 1987
DATE

DEPARTMENT OF ENVIRONMENTAL PROTECTION

Mailed To Parties:

MAR 16 1987
DATE

OFFICE OF ADMINISTRATIVE LAW

ml

WITNESSES

On behalf of Petitioner:

Edward Post
Charles Johnson
Harvey Klein

On behalf of Respondent:

Edwin Rothstein
Roger Goetzel
Joseph Larkin
John Tomasiello
Charles Maack

EXHIBITS*

On behalf of Petitioner:

P-1	Notice of Civil Administrative Penalty Assessment, October 7, 1981 (4 pages with attachments)
P-2	Kuehne's application for a National Pollutant Discharge Elimination System permit, September 26, 1974 (2 pages)
P-3	NPDES permit issued to Kuehne, July 14, 1980 (18 pages)
P-4	Monitoring report, prepared by Kuehne, February 10, 1981 with mailer
P-6	Memorandum from Charles L. Johnson to Charles L. Maack, stamped February 24, 1981
P-7B	Public notice of formulation of draft NPDES permit, March 21, 1980 (3 pages)
P-9I	Photograph of catch basin
P-9J	Photograph of various piping and connections to Kuehne's processing facility
P-10	Garden State Laboratories, Inc. sampling report, January 26, 1981 (2 pages)
P-11	Garden State Laboratories, Inc. sampling report, January 28, 1981 (4 pages)
P-12A through E	Five diagrams related to the Kuehne Chemical Company operation submitted by the petitioner at the request of the administrative law judge, as an incident to the decision on Kuehne's motion for dismissal and the Division's crossmotion for summary decision

On behalf of Respondent:

R-1	Letter from Richard R. Width, Esq. to Michael Diamond, October 27, 1981 (4 pages)
R-4	"Field Procedures Manual for Water Data Acquisition," issued by the Division of Water Resources, November 1980 (unpaginated)

*While all exhibits were consecutively numbered when marked for identification, not all exhibits were ultimately moved into evidence. This accounts for the numerical gaps in the listings.

R-7	Civil action complaint issuing in the matter Linden Chemicals and Plastics Inc. v. Kuehne Chemicl Company, Inc., Superior Court of New Jersey, Law Division: Union County, Docket No. L-11734-80, filed October 31, 1980 (13 pages)
R-8	Letter from C. A. Hansen to Kuehne Chemical Company, to the attention of Roger Goetzel, January 27, 1981
R-9	Diagram of Kuehne/LCP facility, captioned "Drawing No. 101"
R-14a, b, c	Three diagrams of various perspectives of Kuehne's processing facility, two of which are captioned, "drawings no. 102 and 103." The third (R-14c) was handprepared as an incident to the testimony of Mr. Goetzel
R-15	Department of Environmental Protection, phone call report, prepared by Charles Maack in respect to a telephone call with Joseph Larkin, February 13, 1981
R-16	Letter from W. J. Fledderman, LCP plant manager, to Charles Johnson, February 18, 1981

K0086

Exhibit F

State of New Jersey
DEPARTMENT OF ENVIRONMENTAL PROTECTION
DIVISION OF WATER RESOURCES
P. O. BOX CN 029
TRENTON, NEW JERSEY 08625

ARNOLD SCHIFFMAN
DIRECTOR

OCT 7 1981

CERTIFIED MAIL
RETURN RECEIPT REQUESTED

Mr. Roger Goetzel
Registered Agent
642 Rankin Road
Brielle, New Jersey 07719

Re: Kuehne Chemical Company, Incorporated
Linden
NPDES Permit No. NJ 0027707

Dear Mr. Goetzel:

There is enclosed for service upon you a NOTICE OF CIVIL ADMINISTRATIVE PENALTY ASSESSMENT issued by this Department pursuant to the provisions of N.J.S.A. 58:10A-10 (b) and N.J.S.A. 58:10A-10 (d).

If you have any questions concerning this NOTICE, please feel free to contact Mr. James E. Mumman, Chief, Region II, Enforcement and Regulatory Services Element at the address above or by telephoning (609) 292-0686.

Very truly yours,

Arnold Schiffman
Director

Enclosure

State of New Jersey

DEPARTMENT OF ENVIRONMENTAL PROTECTION

DIVISION OF WATER RESOURCES

P. O. BOX CN 029

TRENTON, NEW JERSEY 08625

ARNOLD SCHIFFMAN

DIRECTOR

IN THE MATTER OF : NOTICE OF CIVIL

KUEHNE CHEMICAL COMPANY, INCORPORATED : ADMINISTRATIVE PENALTY ASSESSMENT

The following FINDINGS are made, and NOTICE issued pursuant to the authority vested in the Commissioner of the New Jersey Department of Environmental Protection (hereinafter NJDEP) and duly delegated to the Director of Water Resources by N.J.S.A. 13:1D-1 et seq., N.J.S.A. 13:1B-5, and the New Jersey Water Pollution Control Act, N.J.S.A. 58:10A-1 et seq.

FINDINGS OF FACT

1. On September 27, 1974, Kuehne Chemical Company, Inc. (hereinafter Kuehne), City of Linden, New Jersey applied to the United States Environmental Protection Agency (hereinafter USEPA) for a National Pollutant Discharge Elimination System (hereinafter NPDES) permit. Question 14 of the NPDES application (Short Form C) asks: "Does your dishcarge contain or is it possible for your discharge to contain one or more of the following substances added as a result of your operations, activities, or processes: ammonia, cyanide, aluminum, beryllium, cadmium, chromium, copper, lead, mercury, nickel, selenium, zinc, phenols, oil & grease, and chlorine (residual)." Kuehne answered "no" to this question. Kuehne stated on the permit application that it sought authorization for the discharge of uncontaminated cooling waters only.

2. On July 14, 1980, the Regional Administrator, Region II, USEPA pursuant to the Federal Water Pollution Control Act Amendments of 1972 (P. L. 92-500) issued a NPDES permit No. NJ 0027707 to Kuehne. Said permit was for the discharge of uncontaminated cooling waters only from the Linden plant.

3. In accordance with Part I, Condition A and Part III Condition B. I. of the said permit for Discharge Serial Number 001 (DSN 001), Kuehne was permitted to discharge from a pipe identified as DSN 001, for the period from August 31, 1980 through August 31, 1985, an effluent having the following characteristics. The pH shall not be less than 6.0 standard units nor greater than 9.0 standard units; and the chlorine residual (total) shall not exceed .002 mg/l on a 30 day average.

4. This discharge was conveyed to the receiving water course via a buried pipe which traversed the property of Linden Chlorine Products (hereinafter LCP). On January 1, 1981, LCP officials observed the discharges of effluent from Kuehne's outfall DSN 001 which they believed might have violated Kuehne's NPDES permit limitations.

5. On January 8, 1981, a NJDEP representative visited the Kuehne facility to inspect the discharge pipe permitted by No. NJ 0027707. NJDEP and LCP representatives collected and split samples approximately one hundred (100) feet downstream from Kuehne's outfall DSN 001. These were collected hourly between 1:00 p.m. and 6:00 p.m. Analyses of these samples (see following table) revealed pH levels (both high and low) and high concentrations of alkalinity and chloride.

			LCP Lab	NJDEP Lab	
Sample	Location	Time	pH	Alkalinity (mg/l)	Chloride (mg/l)
C-12838	in flume 100' from Kuehne's outfall DSN 001	1:00 p.m.	10.06	470.7	5550
C-12839	in flume 100' from Kuehne's outfall DSN 001	2:00 p.m.	10.52	485.1	3050
C-12840	in flume 100' from Kuhene's outfall DSN 001	3:15 p.m.	9.19	711.1	3550
C-12842	in flume 100' from Kuehne's outfall DSN 001	4:15 p.m.	4.70	0	3500
C-12844	in flume 100' from Kuehne's outfall DSN 001	5:15 p.m.	9.98	496.5	3250
No #	Kuehne's outfall DSN 001	6:00 p.m.	2.62	not	analyzed

6. On January 15 & 16, 1981, Garden State Laboratories, consultants for LCP, conducted hourly sampling of Kuehne's NPDES permitted outfall DSN 001. The consultants analyzed the samples in LCP's laboratory immediately after each sample was taken. The laboratory results revealed pH levels (up to 10.16) in violation of Kuehne's NPDES permit pH limits and extremely high concentrations of free chlorine and caustics (See Table I in appendix). The aforementioned conditions or activities are not in conformance with Part I, Condition A and Part III, Condition B. I. of the aforementioned NPDES Permit; therefore, Kuehne is in violation of N.J.S.A. 58:10A-1 et seq.

7. On January 25 & 26, 1981, Garden State Laboratories again conducted hourly sampling of Kuehne's NPDES permitted outfall DSN 001. Analyses of these samples revealed pH levels (up to 11.44) in violation of Kuehne's NPDES permit pH limits, and extremely high concentrations of free chlorine and caustics (See Table II in appendix). Free chlorine was present in concentrations as high as 124,430 mg/l. This is similar to the concentration of chlorine found in bleach, a product manufactured by Kuehne. The aforementioned conditions or activities are not in conformance with Part I, Condition A and Part III, Condition B. I. of the aforementioned NPDES permit, therefore, Kuehne is in violation of N.J.S.A. 58:10A-1 et seq.

8. On January 26, 1981, a NJDEP representative visited Kuehne and observed a valve connecting Kuehne's filtering process pipe to the NPDES permitted outfall DSN 001 pipe. The inspector directed Mr. Scott L. Charlop, Manufacturing Manager of Kuehne, to immediately remove this connection. This connection had provided a physical conduit for the passage of pollutants into the waters of the State.

9. On January 27, 1981, a NJDEP representative inspected Kuehne and observed that the aforementioned connection had been removed.

10. On January 27, 1981, Kuehne ceased operations and closed the plant.

11. The discharge of pH and free chlorine in excess of the limitations contained in NPDES permit No. NJ 0027707 is a violation of N.J.S.A. 58:10A-1 et seq.

NOTICE OF INTENT TO ASSESS A CIVIL ADMINISTRATIVE PENALTY

12. Based upon the above findings, NJDEP intends to assess a civil administrative penalty pursuant to N.J.S.A. 58:10A-10 (d) and N.J.A.C. 7:14-8.1 et seq. for submitting false information in a NPDES permit application, discharging pollutants not listed in the NPDES permit, and exceeding effluent limits of the permit.

13. Based upon a review of the criteria contained in N.J.A.C. 7:14-8.10, and N.J.S.A. 58:10A-10 NJDEP has determined that the amount of the penalty shall be $17,500.

14. NOTICE IS HEREBY GIVEN THAT pursuant to N.J.S.A. 52:14B-1 et seq., and N.J.S.A. 58:10A-10 (b) and (d) Kuehne is entitled to a hearing before NJDEP. Any hearing request shall be delivered to the address below within twenty (20) days from receipt of this Notice. The hearing request shall be mailed to:

Michael Diamond, Administrator
Enforcement & Regulatory Services Element
Division of Water Resources
P. O. Box CN-029
Trenton, New Jersey 08625

15. NOTICE IS FURTHER GIVEN THAT pursuant to N.J.S.A. 52:14B-9 (b) (4) and N.J.A.C. 15:15-10.2 (b) (4), the applicant in its application for a hearing shall furnish NJDEP with a definite and detailed statement of the matters it will assert in the requested hearing. Any request for a hearing must include a written statement specifying with particularity:

    (a) Any of the Findings of Fact set forth above, or specific portion thereof, which the applicant disputes;

    (b) The applicant's counterstatement of any facts so disputed; and

    (c) The Notice provisions to which the applicant objects, the reason for such objections, and any alternative provisions proposed by the applicant.

16. NOTICE IS FURTHER GIVEN THAT if no request for a hearing is received within twenty (20) days, this NOTICE shall become final and the Penalty is due immediately thereafter. Payment may be made to the Department of Environmental Protection at the above address.

17. NOTICE IS FURTHER GIVEN THAT pursuant to N.J.S.A. 58:10A-10 (e) any person who fails to pay the Civil Administrative Penalty in full after it is due shall be subject to civil penalties of up to $10,000 per day for each day of violation.

18. NOTICE IS FURTHER GIVEN THAT pursuant to N.J.S.A. 58:10A-10 (f) willful or negligent violation of N.J.S.A. 58:10A-1 et seq. is a misdemeanor punishable, upon conviction, by criminal penalties of up to $25,000 per day of violation.

This NOTICE shall be effective upon receipt.

DATE: OCT 7 1981

ARNOLD SCHIFFMAN
DIRECTOR

APPENDIX

TABLE I

DATE	TIME	pH	AVAILABLE CHLORINE mg/l	CAUSTIC mg/l
1/15/81	9:05 p.m.	10.13	670	270
	10:05 p.m.	10.10	4,070	340
	11:05 p.m.	10.03	520	260
1/16/81	12:05	10.10	2,540	280
	1:05 a.m.	10.16	90	310
	2:10 a.m.	9.97	180	160
	3:10 a.m.	9.01	230	30
	4:05 a.m.	8.35	20	0.00

TABLE II

1/25/81	7:05 p.m.	9.51	380	30
	8:05 p.m.	9.17	40	20
	9:05 p.m.	9.03	130	20
	10:05 p.m.	8.84	30	20
	11:10 p.m.	8.73	50	20
1/26/81	12:00 MID	11.28	68,770	1,740
	1:00 a.m.	11.27	120,880	2,140
	2:05 a.m.	11.29	124,430	2,150
	3:05 a.m.	8.93	230	10
	4:05 a.m.	8.31	70	0.00

Exhibit G

LINDABURY, McCORMICK & ESTABROOK
A PROFESSIONAL CORPORATION
ATTORNEYS AT LAW
P.O. BOX 519
184 ELM STREET
WESTFIELD, NEW JERSEY 07091
(201) 233-6800

FRANCIS X. McCORMICK
KENNETH L. ESTABROOK
RICHARD R. WIDTH
ANTHONY J. LaRUSSO
PETER A. SOMERS
WILLIAM R. WATKINS

WILLIAM R. CLOUGH
EDWARD J. FRISCH
JOHN H. SCHMIDT, JR.
DONALD F. NICOLAI
JOHN R. BLASI
BRUCE P. OGDEN
CRAIG N. GREENAWALT
RICHARD G. CREDO

JOSEPH S. LINDABURY
OF COUNSEL

8 MAIN STREET
FLEMINGTON, N.J. 08822
(201) 782-8000

PLEASE REPLY TO/WESTFIELD OFFICE

RECEIVED
OCT 27 4 24 PM '81
NJ DEPT ENV PROTECTION
DIV WATER RESOURCES
PWPE

October 27, 1981

Mr. Michael Diamond, Administrator
Enforcement & Regulatory Services Element
Division of Water Resources
P. O. Box CN-029
Trenton, New Jersey 08625

Re: Kuehne Chemical Company, Inc.
Linden
NPDES Permit No. NJ 0027707

Dear Mr. Diamond:

We are the attorneys for Kuehne Chemical Company, Inc. (hereinafter "KCC"), and have received a copy of the Notice of Civil Administrative Penalty Assessment issued by the Department of Environmental Protection (DEP), against KCC, which Notice was issued on October 7, 1981, and received by KCC on October 9, 1981.

On behalf of KCC, this is to advise that the DEP's proposed action is contested, that a hearing is requested, and that the matter should be transferred to the Director of the Office of Administrative Law for a hearing. In addition to the foregoing, KCC will be requesting discovery prior to the hearing.

KCC is a manufacturer of sodium hypochlorite. Linden Chemicals and Plastics, Inc. (hereinafter "LCP"), is a manufacturer of chlorine and caustic from whom KCC obtained raw material for its product. For many years, and up until January 27, 1981, KCC's manufacturing facilities had been

located on property leased from LCP and adjoining LCP's manufacturing facility in Linden, New Jersey. For years the two companies were physically and economically entwined.

In 1980, disputes between the parties came to a head. KCC was unhappy with prices of material, and it was distressed by LCP's failure to sell the leased property pursuant to an option to purchase contained in the lease. LCP believed it was losing its product and began to blame KCC. These and other differences culminated in a suit entitled Linden Chemicals & Plastics, Inc., etc. v. Kuehne Chemical Company, Inc., etc., et. al. -and- Kuehne Chemical Company, Inc., etc., et al. v. Christian A. Hansen, et. al., Superior Court of New Jersey, Law Division, Union County, Docket No. L-11734-80. This suit was commenced on October 31, 1980.

One of LCP's claims against KCC is that KCC "repeatedly violated Federal, State and City law, regulations and ordinances by the discharging of sodium hypochlorite into the waters of the state." These discharges allegedly subjected KCC to forfeiture of its lease which contained the option to buy which LCP was failing to honor.

Since the commencement of the suit LCP has terminated KCC's lease, which termination was and is contested by KCC.

When LCP first made its complaint about KCC's alleged discharges it apparently had no evidence of any unpermitted discharges. Lacking such evidence, LCP apparently decided to "develop" such evidence by calling in the DEP and LCP's consultants, both of which allegedly found unpermitted discharges.

We submit that the "evidence" which they obtained, even assuming that it was not placed there by LCP, does not support the charges made by the DEP against KCC. We further submit that the DEP's actions in this matter were both contrary to its normal procedures in the manner in which the sampling and testing was performed, and highly inappropriate in that the DEP allowed itself to be used by an adverse party in litigation.

The Findings of Fact in the Notice of Civil Administrative Penalty Assessment are insufficient to find any

violation by KCC. For example, the DEP tests measured chlorides not chlorine, alkalinity/caustic test results show the presence of substantial carbonates which could only have come from LCP, the DEP tests indicate two significant discharges of acid and KCC does not use or discharge any acid, the ratios of chlorine to caustic in almost all of the test samples are not indicative of the ratios found in sodium hypochlorite, and there is no evidence of a thirty day average of Chlorine Residual.

The Findings of Fact also contain untrue or questionable findings and omit relevant information. Untrue findings are found in paragraph 2, second sentence; paragraph 6, first sentence and third sentence concerning free chlorine; paragraph 7, first sentence and second sentence concerning free chlorine; and paragraph 8, third sentence to the extent it finds that impermissible pollutants actually went into New Jersey waters. Questionable findings, i.e. those of which we have no present knowledge, are paragraph 4, second sentence; paragraph 5, except that KCC knows that a NJDEP representative visited the KCC facility on January 8, 1981; paragraph 6, except for the untrue items; and paragraph 7, except for the untrue items.

KCC received permit #NJ 0027707 so as to enable it to discharge cooling tower waters into State waters. The discharge was by means of a plastic pipe which discharged into a standpipe leading to an outdoor catch basin. This catch basin in turn was connected by a pipe to a flume. This connecting pipe was approximately 150 feet long. It was predominantly located on the land of LCP and it was pourous. The flume is hundreds of feet long. It collects material which drains into it from the lands of GAF, KCC, LCP and perhaps others. It is also subject to the ebb and flow of the tide thereby causing material in the flume to flow backwards and forward.

KCC's cooling tower discharge was never sampled and tested by the DEP or LCP's agents, Garden State Laboratories. None of the tested samples are relevant to the DEP's charges. This is apparent from an examination of the Findings themselves, and it becomes even more obvious when other omitted facts are taken into account. Such additional facts include the ability of surface water run-off from LCP to

enter the catch basin, the porosity of the connecting pipe belonging to LCP, the continuance of flow through the connecting pipe after KCC entirely ceased its operations, LCP's acid leaks and its deposit of soda ash in an effort to counteract the effects of the acid spills, LCP's caustic leaks, LCP's chlorine leaks and other discharges related to its inability and/or unwillingness to properly control its processes, the vast amount of potential sources of discharges into the flume coupled with the flume's longstanding existence, the ebb and flow of the tide in the flume, and LCP's motivations.

Very truly yours,

LINDABURY, McCORMICK & ESTABROOK

Richard R. Width

RRW:ldk
cc: Mr. Arnold Schiffman
Kuehne Chemical Company, Inc. (2)

Exhibit H

ADM-012

MEMO

NEW JERSEY STATE DEPARTMENT OF ENVIRONMENTAL PROTECTION

PS

TO Charles L. Maack, Principal Environmental Engineer, Region II (CLM)

FROM Charles L. Johnson, Senior Environmental Engineer, Region II (CLJ) DATE February 24, 1981

SUBJECT Inspection of Kuehne Chemical Company, Inc., Linden

On January 26, 1981, the writer, accompanied by Mr. John Tomasiello visited Linden Chlorine Products (LCP) in order to observe the excavation of Kuehne Chemical's concealed discharge pipe.

At 2:00 p.m., the inspectors sampled the permitted Kuehne discharge (#2437) and in the flume upstream of said discharge (#12438).

Personnel from LCP then proceeded to excavate the discharge line from Kuehne Chemical to the outfall in the flume by digging with a backhoe adjacent to the flume. No second pipe was found. While digging, ground water was encountered and sampled by LCP. ~~The pH of said water was 11+.~~ The digging continued and approximately 12 feet from the pipe outfall a large break on the underside of the pipe was uncovered. A large flow of discharge water flowed from this break suggesting that it may be the source of wastewater leaking through the flume walls.

S.R.

An inspection of Kuehne was made after observing a valve connecting Kuehne's filtering process lines to their discharge line. Mr. Scott L. Charlop, Manufacturing Manager of Kuehne was questioned about the valve and responded by stating that this valve was opened only during the backwash of Kuehne's filtering system. The writer stated that this valve was unexceptable and must be removed.

On January 27, 1981, the writer returned to LCP and Kuehne Chemical to observe further digging of Kuehne's discharge line. The contractor hit a concrete encasement which ran the entire length of the pipe after commensing to dig and therefore halted any further digging. It was then observed by the writer that Kuehne had disconnected the valve in question.

Conclusions and Recommendations:

The writer feels that Kuehne Chemical Company dumped caustic material with the use of the valve in the process valve and acid by pouring hydrochloric acid into their discharge line. This mixing may be the cause of a very strong smell of chlorine gas at Kuehne's discharge on January 8, 1981. The leakage from the walls of the flume was probably caused by the break in the discharge line. Because of the different flow rates involved in the pipe and through the 12 feet of soil, a lag time was shown in the flow of materials (and pH) in the leakage suggesting a possible second pipe. The sampling data obtained by LCP should be expediently coordinated with Division data for use in enforcement action.

E54:G9

cc: James Mumman
Keith Onsdorff

P-5
Enf. & P
4/8/81

A

P6
P/6
P/6
*D
4/8/68

Charles L. Maack, Principal Environmental Engineer, Region II

Charles L. Johnson, Senior Environmental Engineer, Region II

FEB 24 1981

Inspection of Kuehne Chemical Company, Inc., Linden

On January 8, 1981, the writer visited the Linden Chlorine Products (LCP) plant in Linden as part of the ongoing investigation of the neighboring Kuehne Chemical Company.

The writer met with Mr. Bill Fledderman, Plant Manager, upon arriving at LCP, and was informed by him that Kuehne Chemical had continued the dumping of caustic material from what Mr. Fledderman thought was a concealed pipe. The writer stated that samples would be taken at several intervals during the day from the flume into which Kuehne supposedly dumps.

Samples were taken at hour intervals from the water in the flume approximately 50 feet from Kuehne's discharge. Split samples were taken by LCP and were tested for a pH, free chlorine and per cent bleach. Listed below is the sample No., time the sample was taken, and the pH of the split sample taken by LCP:

Sample	Time	pH
C12838	1:00 p.m.	10.06
C12839	2:00 p.m.	10.52
C12840	3:10 p.m.	9.19
C12842	4:15 p.m.	4.70
C12844	5:15 p.m.	9.93

At 6:00 p.m., the writer and an LCP representative walked to the Kuehne Chemical discharge point where a strong odor of chlorine was smelled. Sample (C12846) was taken from the flume approximately 3 feet upstream of Kuehne's discharge point. A split sample taken to LCP's lab revealed a pH of 10.40. A sample was then taken from Kuehne's permitted discharge. The discharge was clear and a split sample taken to the LCP lab revealed a pH of 2.62.

Conclusions and Recommendations

Kuehne Chemical Company is dumping acid and caustic material. Enforcement action should be taken immediately.

354:G9

cc: James Hunman
Keith Onsdorff

Exhibit D.

Exhibit I

R-7 EV

R7
AR
12/11/86

ORIGINAL FILED
October 31, 1980

SHANLEY & FISHER
550 Broad Street
Newark, New Jersey 07102
(201) 643-1220
Attorneys for Plaintiff,
Linden Chemicals & Plastics, Inc.

SUPERIOR COURT OF NEW JERSEY
LAW DIVISION: UNION COUNTY
DOCKET NO. L- 11734-80

LINDEN CHEMICALS & PLASTICS, INC., a Corporation of the State of Delaware,

Plaintiff,

vs.

KUEHNE CHEMICAL COMPANY, INC., a Corporation of the State of New Jersey, PETER R. KUEHNE, ROGER F. GOETZEL, JOHN DOE and RICHARD ROE,

Defendants.

Civil Action

COMPLAINT

Linden Chemicals & Plastics, Inc., a corporation of the State of Delaware authorized to do business in the State of New Jersey, with its New Jersey manufacturing facilities located in Linden, New Jersey, by way of Complaint against the defendants, says:

FIRST COUNT

1. Plaintiff is a corporation of the State of

Delaware authorized to do business in the State of New Jersey, which was known as Linden Chlorine Products, Inc. prior to June 5, 1978, and together with its wholly-owned subsidiary, LCP Chemicals-New Jersey, Inc. are collectively hereinafter referred to as "LCP".

2. Defendant Kuehne Chemical Company, Inc., (hereafter "K.C.C."), is a corporation of the State of New Jersey, with executive offices at 14 Commerce Drive, Cranford, New Jersey and manufacturing facilities in Linden, N.J. on property adjoining the LCP manufacturing facility in Linden, and on land leased from LCP.

3. Defendant Peter R. Kuehne is the president and chief executive officer of K.C.C., residing in Brevard, North Carolina. He has also been a member of the Board of Directors of LCP at all relevant times referred to herein.

4. Defendant Roger F. Goetzel, residing at 642 Rankin Road, Brielle, New Jersey, is Vice-President and general manager of K.C.C.

5. John Doe and Richard Roe are employees or agents of K.C.C. whose identities are presently unknown and who have knowingly engaged in the activities alleged herein, and participated in concert and individually to defraud and deprive LCP of its property and contractual rights as alleged herein.

6. The defendants Peter R. Kuehne and Roger F. Goetzel acted knowingly and willfully both individually and in concert with others and each other to deprive plaintiff of its property and its contractual rights as alleged herein.

7. Plaintiff and defendant K.C.C. entered into contracts and agreements with LCP, currently in effect, including but not limited to an agreement dated February 4, 1977, and maintained as a continuing course of dealing, the effectuation of those agreements, whereby LCP agreed to supply and K.C.C. agreed to purchase all of K.C.C.'s requirements of chlorine and caustic soda for manufacturing and marketing of bleach (sodium hypochlorite), and resale of chlorine and caustic soda.

8. K.C.C. was entrusted with, and agreed to assume, the responsibility to forward to LCP a truthful and accurate report of the quantity of chlorine and caustic soda taken by K.C.C. from LCP for use in the sodium hypochlorite manufacturing processes of K.C.C., resale of caustic soda, repackaging and sale of chlorine.

9. K.C.C , Peter R. Kuehne, Roger F. Goetzel, John Doe and Richard Roe have acted in concert and individually to breach the contract of K.C.C. with LCP with respect

to K.C.C 's obligations to make such reporting and in fact were responsible for and did misrepresent the amounts of chlorine and caustic soda taken by K.C.C. from LCP both individually and as components of sodium hypochlorite.

WHEREFORE, plaintiff LCP demands an accounting, compensatory and punitive damages, interest and costs of suit.

SECOND COUNT

1. Plaintiff repeats and reiterates each of the allegations contained in the First Count of this Complaint as though fully set forth at length herein.

2. By such actions, the defendants, each of them individually and in concert, acted to, and did, convert the property of the plaintiff to their own use, and did so with the intention of depriving permanently the plaintiff of its possession of its property and its enjoyment to the proceeds from the sale of that property.

WHEREFORE, plaintiff demands an accounting, compensatory damages, punitive damages, interests and costs

THIRD COUNT

1. Plaintiff repeats and reiterates each of the allegations set forth in the First and Second Counts of this Complaint as if fully set forth at length herein.

2. Plaintiff and defendant K.C.C entered into various agreements dated February 4, 1977, whereby defendant K.C.C. agreed to sell manufactured product of K.C.C. to customers of both K.C.C. and customers of LCP. Pursuant to said agreements, defendant K.C.C. undertook to remit to the plaintiff a portion of the profit it received from the delivery and sale of manufactured product.

3. The defendants, individually and in concert, raised sales prices but withheld from LCP required notifications as to such increases, a portion of which, by the aforementioned agreements, was due and owing to LCP.

4. In so doing, defendants breached or caused to have breached the agreements between LCP and K.C.C. as aforementioned.

WHEREFORE, the plaintiff demands a full accounting of the sale of all such products to customers of LCP and K.C.C., and furthermore demands compensatory damages, punitive damages, interest and costs.

FOURTH COUNT

1. Plaintiff repeats and reiterates each of the allegations set forth in the Counts above as if fully set forth at length herein.

2. The failure of defendants to notify LCP of the

increase in sales price was a fraudulent misrepresentation of the sales price and constituted a tortious conversion of the property of LCP to their own use and deprived LCP of its rightful use of its property.

WHEREFORE, the plaintiff demands a full accounting of the sale of all such products to customers of LCP and K.C.C., and furthermore demands compensatory damages, punitive damages, interest and costs.

FIFTH COUNT

1. Plaintiff repeats and reiterates each of the allegations set forth above as if fully set forth at length herein.

2. Contrary to and in breach of its agreement with LCP, K.C.C. and the individual ~~defendants~~ individually and in concert purchased chlorine and caustic soda from suppliers other than LCP.

WHEREFORE the defendants have willfully breached the agreement between LCP and K.C.C., and the plaintiff demands judgment as against each and all of the defendants for an accounting, compensatory and punitive damages, interests and costs.

SIXTH COUNT

1. Plaintiff repeats and reiterates each of the allegations set forth in the Counts above as if fully set

forth at length herein.

2. A portion of such material purchased from suppliers other than LCP was returned to LCP by K.C.C. under the misrepresentation by K.C.C. and the individual defendants, individually and in concert, that said material had been supplied by LCP's Linden plant and was defective.

3. Defendants did so falsely and with deliberate intent to mislead and defraud LCP by inducing LCP to issue credit memoranda against amounts due and owing for the return of this material.

4. LCP relied on said misrepresentations and issued credit memoranda on said material.

WHEREFORE, the defendants have breached the agreement between LCP and K.C.C., have defrauded LCP through the issuance of said false reports, and the plaintiff demands judgment as against each and all of the defendants for an accounting, compensatory and punitive damages, interests and costs.

SEVENTH COUNT

1. Plaintiff repeats and reiterates each of the allegations set forth in the Counts above as if fully set forth at length herein.

2. By agreement dated July 21, 1972, K.C.C. undertook to provide certain services, including loading and

shipping on the basis of reimbursement of cost plus a stated percentage.

3. The defendants individually and in concert, have falsely and deliberately overstated the service costs of rendering loading and shipping services to LCP by K.C.C., including the costs of loading and cleaning of trucks.

4. In so doing, LCP has been defrauded and has expended substantial funds for services as falsely reported by the defendants.

WHEREFORE, the plaintiff demands compensatory damages, punitive damages, interest and costs.

EIGHTH COUNT

1. Plaintiff repeats and reiterates each of the allegations set forth in the Counts above as if fully set forth at length herein.

2. By agreements oral and written, including an agreement dated July 21, 1972, K.C.C. undertook to serve as a carrier for product of LCP to be delivered to customers of LCP.

3. In breach of the aforesaid agreement, and in breach of its duty as a carrier, K.C.C. and the individual defendants converted said products including, but not limited to, chlorine, caustic and muriatic acid, to their own use.

WHEREFORE, the plaintiff demands an accounting, compensatory and punitive damages, interest and costs.

NINTH COUNT

1. Plaintiff repeats and reiterates each of the allegations set forth in the Counts above as if fully set forth at length herein.

2. By agreement dated February 4, 1977, K.C.C. undertook to purchase its requirements of chlorine and caustic soda from LCP and agreed that the terms of payment would be net cash in thirty (30) days from the date of invoice.

3. K.C.C. has frequently and repeatedly failed to pay for the product it purchased as required under said agreement.

WHEREFORE the plaintiff demands a judgment declaring K.C.C. to be in default under the agreement of February 4, 1977 and further demands an accounting, compensatory damages, interest and costs.

TENTH COUNT

1. Plaintiff repeats and realleges all of the allegations made in the previous Counts of the Complaint.

2. LCP and K.C.C. and Peter R. Kuehne have had a business relationship based on trust and confidence extending over several years whereby, among other things,

LCP sells its product to K.C.C., uses K.C.C. at times as its carrier and to perform certain services, leases to K.C.C. the property on which K.C.C.'s facilities are located and shares certain common facilities with K.C.C. Additionally, the defendant Peter R. Kuehne is a director and shareholder of LCP and is in a position of trust and confidence and privy to insider information.

3. K.C.C., through Peter R. Kuehne, its president and chief executive officer, has offered to purchase the Linden assets of LCP at below fair value, but LCP rejected the offer.

4. During at least the last three years, unknown to LCP, the defendants were deliberately and systematically engaged in an effort to harm and destroy LCP financially and to harm or destroy its business reputation in order that K.C.C. might take over, at a reduced price, LCP's Linden plant, facilities and customers.

5. In the course of this effort defendants have, among other things:

a. Converted LCP products to their own use;

b Purchased materials from another supplier in breach of the agreement between K.C.C. and LCP;

c. Returned inferior or defective material to LCP, covertly and overtly, misrepresenting the material to

be LCP product and obtaining a credit from LCP to which they were not entitled;

d. Increased sales prices to profit share customers without notifying LCP and without sharing such price increases with LCP;

e. Misrepresented K.C.C.'s costs in order to deprive LCP of its rightful profit.

f. Overchanged LCP for certain services.

6. By such acts and conduct defendants have tortiously and maliciously interfered with LCP's prospective economic advantage; caused loss of profits and increased operating expenses; and damaged LCP's future earnings.

WHEREFORE, plaintiff demands compensatory damages, punitive damages, interest, and costs of suit.

ELEVENTH COUNT

1. Plaintiff repeats and realleges all of the allegations made in the previous Counts of the Complaint.

2. Defendant Peter R. Kuehne, as a director of LCP, owed a fiduciary duty to LCP.

3. Defendant Peter R. Kuehne breached these fiduciary duties.

WHEREFORE, plaintiff demands compensatory damages, punitive damages, interest and costs of suit against defendant Peter R. Kuehne.

TWELFTH COUNT

1. Plaintiff repeats and realleges all of the allegations made in the previous Counts of the Complaint.

2. As a member of the Board of Directors, Peter R. Kuehne had access to knowledge of confidential financial and business information relating to corporate opportunities of LCP.

3. Peter R. Kuehne wrongfully appropriated and usurped said corporate opportunities for his own benefit and the benefit of the other defendants.

WHEREFORE, plaintiff demands compensatory damages, punitive damages, interest and costs of suit against defendant Peter Kuehne.

THIRTEENTH COUNT

1. Plaintiff repeats and reiterates each of the allegations contained in the First Count of this Complaint as though fully set forth at length herein.

2. K.C.C. currently conducts its manufacturing operation on land leased from LCP pursuant to a written lease dated July 21, 1972 which has expired but tenant continues to occupy the premises as a holdover tenant.

3. Tenant has repeatedly violated Federal, State and City law, regulations and ordinances by the discharging

of sodium hypochlorite into the waters of the state.

4. Such discharges have created a nuisance, generated noxious fumes and otherwise materially affected the operations of Plaintiff so as to subject K.C.C. to forfeiture of its holdover tenancy.

WHEREFORE, Plaintiff demands judgment declaring that K.C C.'s tenancy may be terminated by plaintiff.

JURY DEMAND

Plaintiff Linden Chemicals & Plastics, Inc. hereby demands a trial by a jury on all issues.

SHANLEY & FISHER, ESQS.
Attorneys for Plaintiff,
Linden Chemicals & Plastics, Inc.

By _____
John J. Francis, Jr.

Exhibit J

LEAVE BLANK

EVIDENCE/PROPERTY/PHOTO's received as listed ☐

DATE: 2/6/81

#

POLICE DEPARTMENT
LINDEN, NEW JERSEY
OFFENSE REPORT

E # 81-02208

OFFENSE REPORTED EMBEZZLEMENT

NIC/

SIC/

Victim/Complainant WILLIAM FLEDDERMAN AGE 34, DOB 12/4/46

Address 225 PARKER RD LONG VALLEY N.J. Phone

Reported by SAME Address L.C.P. CHEMICALS CO SOUTH WOOD AVE LINDEN N.J.

Place of Occurrence L.C.P. CHEMICALS District 4TH

Report Received by CAPT BARTUS at 11:11 AM Date 2/6/81

Date and Time Offense Committed BETWEEN 1975 AND 10/80 How Reported WALK IN

Officers Assigned DET V. KLEBAUR ARREST — Yes ☐ No ☒

Remarks

Report of Officer (State Fully Circumstances of Investigation)

11:11 AM 2/6/81 DETAILED BY DET SGT J.WILLIAMS TO THE CHIEFS OFFICE TO TAKE A REPORT OF A ALLEGED EMBEZZLEMENT

MR WILLIAM FLEDDERMAN, AGE 34 DOB 12/4/46, WHITE MALE, AN EMPLOYEE OF L.C.P. CO, SOUTH WOOD AVE LINDEN N.J. REPORTED THE FOLLOWING

L.C.P. CO OWNS PROPERTY OFF SOUTH WOOD AVE IN LINDEN N.J., SOUTH OF THE N.J. TURNPIKE. ANOTHER COMPANY, KUEHNE CO, LEASES SOME OF THAT PROPERTY FROM LCP. FLEDDERMAN STATED THAT LCP IS PRESENTLY INVOLVED IN CIVIL LITIGATION AGAINST KUEHNE CO, THEY HAVE CIRCUMSTANTIAL EVIDENCE AGAINST KUEHNE INVOLVING EMBEZZLEMENT OF PRODUCTS. THE N.J. DEPT OF ENVIRONMENTAL PROTECTION, THE UNION COUNTY PROSECUTOR S OFFICE(A/P DAVID HANCOCK) AND THE N.J. ATTORNEY GENERALS OFFICE ARE, ACCORDING TO FLEDDERMAN, AWARE OF THE AFOREMENTIONED FACTS.

FLEDDERMAN FURTHER STATED THAT IN OCTOBER 1980 L.C.P. CO, BY ACCIDENT, TOOK SAMPLES OF A GROUND WATER STREAM THAT RUNS THROUGH THE PROPERTY INTO THE ARTHUR KILL. THEY DISCOVERED A LARGE VOLUMN OF BLEACH AND CAUSTIC SODA. THE VOLUMN WAS SUCH THAT IT VIOLATED THE LAW.

L.C.P. DID TWO THINGS, FIRST THEY CONFIRMED THAT THE DUMPING WAS NOT DONE

Det. Sgt. K. Klebaur 2/6/81 | Capt. D.A. Bartus 2/6/81

Supplementary Offense Report
POLICE DEPARTMENT
Linden, New Jersey

Offense REPORTED EMBEZZLEMENT B.F. # 81-02208

Complainant WILLIAM FLEDDERMAN

Address 225 PARKER RD LONG VALLEY N.J.

Additional Details of Investigation

BY THEM. THE SECOND THING WAS TO TRACE THE PROBLEM TO A SEWER PIPE FROM THE KUEHNE CO. THE D.E.P. HAS BEEN TO THE SITE

ON 1.26.81 THERE WAS A PLANT SHUT DOWN AT L.C.P. AND CHLORINE GAS WAS RELEASED INTO THE AIR.

THE CO. FEELS THAT SABOTAGE IS THE REASON FOR THE UNEXPLAINED SHUT DOWN.

THE DEP AND THE LINDEN BOARD OF HEALTH RECEIVED CALLS ABOUT THE SMELL AND FLEDDERMAN STATED THE LCP CO FEELS THAT THE KUEHNE CO IS RESPONSIBLE FOR THE CALLS.

2/6/81 DET KLEBAUR NOTIFIED A/P DAVID HANCOCK OF THE UNION COUNTY PROSECUTORS OFFICE AND HANCOCK STATED THAT THEY ARE AWARE OF THESE INCIDENTS EXCEPT THE LAST. HE STATED THAT THE INVESTIGATION IS BEING CONDUCTED BY THE N.J. ATTORNEY GENERALS OFFICE.

2/6/81 DET KLEBAUR CALLED DEPUTY ATTORNEY GENERAL GREG SAKOWICZ.

Signed Vincent Klebaur Date 2/6/81
Investigating Officer

Signed [signature] Date 2/6/81

Exhibit K

CHEMICALS-N.J., INC.
A Subsidiary of Linden Chemicals & Plastics, Inc. • P.O. Box 484 • Linden, NJ 07036 • (201) 862-1666

R-16

RECEIVED
FEB 20 1981
NJ DEP
DIV WATER RESOURCES
HS&E

A.R.

February 18, 1981

1-2/16/81

Mr. Charles Johnson
Dept. of Environmental Protection
Division of Water Resources
P.O. Box CN029
Trenton, New Jersey 08625

Dear Charlie:

Confirming our conversation of February 14, 1981.

Following his phone conversation to you regarding the contamination of the flume at the point of our prior excavation, Joe Larkin of Kuehne Chemical Co. notified the Linden Board of Health.

A Mr. Henry Gavan of the Board of Health came into the plant on February 14, to inspect the site. He told Larkin that he knew the DEP was involved and that being the case, "He had no jurisdiction and could provide no assistance in what was obviously an offspring of a complex civil matter."

On the 14th, the water entering the flume at the point of excavation was approximately 5 GPM of groundwater with a ph of 11.2. Downstream of the flume, this small flow had diluted sufficiently to yield a ph of less than 8. This typifies what our analysis has been since Kuehne curtailed operations at Linden, i.e., flow rates of 0-5 GPM with a ph range of 9.5 to 11.5, that dilute to within normal levels in a relatively short span of the flume.

The phenomena is obviously ground water and tidal backwash leaching caustic soda from the contaminated soil in the area of the previous Kuehne Chemical dumping site.

Will keep you appraised of any further development.

Sincerely,

W.J. Fledderman,
PLANT MANAGER

WJF/ph
cc: Messrs. K. Ornsdorff - DEP
C.A. Hansen - LCP
R.J. Burkett - LCP